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IRON AGE

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THE IRON AGE

DECEMBER 7, 1939

ESTABLISHED 1855

Vol. 144, No. 23

Have You Ever Laid an Egg?

N asking this question, I am not suffering from the illusion that The Iron Age has become the Barnyard Journal. The question is asked metaphorically, rather than literally.

I do not need to elaborate upon the meaning of this expression as applied to human conduct. To "lay an egg" in such case means to execute a flop, make a bull or to fire a dud. In case this Shakespearian English is unintelligible to some, I will amplify it by saying that "laying an egg" is attempting something that fizzles.

In this connection, permit me to call your attention to what is perhaps the largest egg of this sort that has yet been laid. I refer to the settlement of the Chrysler strike.

This strike, which as you know was the largest in the history of the automobile business, kept more than 50,000 Chrysler men out of work for 56 days.

The strike was called by the UAW, a CIO affiliate, under the direction of Richard T. Frankensteen and others, who Benjamin Stolberg in his current expose of Communism in American labor recently appearing in the New York Herald Tribune declares are disciples of Stalin. Among other things, the UAW demanded the closed shop, the check-off of union dues and the management of production.

After more than a sixth of a year of idleness had ensued due to these fantastic and impossible demands, the strike was settled for a wage rise of three cents an hour. Or, if you prefer big figures to little ones, for \$5 millions per year added to the Chrysler payroll.

Five million dollars a year is a nice boost in pay. I would like to have it myself. But when it is distributed among 50,000 people, it shrinks considerably. It comes down, figure it as you will, to that little three cents an hour.

That is something for Chrysler labor to think about and for every dues-paying member of the UAW to think about. Three cents an hour!

What did you get for what you paid? Chrysler employees, to get this three cents an hour rise, which amounted to \$5 millions a year total, gave up \$15 millions in wages during the 56 days of idleness.

At the end of three more years, if work is steady, the Chrysler boys who goose stepped out of the plants in obedience to Mr. Frankensteen's command will be back again, financially, to where they started from two months ago. For in three years the three cent rise will have brought them in enough money to just equal what they lost during the strike.

This latest victory march of the UAW, which consisted of three steps backward for each one forward, reminds me of Napoleon's celebrated march into Russia. It was many, many years before the surviving French who participated in that march got back what it cost them.

But then, the French followers of Napoleon had the satisfaction, at least, of knowing that their leader really intended to do them good.

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Tellurium Selenium And Sulphur

IN COPPER ALLOYS

ETALLURGISTS in recent years have devoted much time and energy to the devising of alloys showing improvements in their various properties, so that today each basic metal industry is well supplied with a variety of alloys, each having its own particular merit. In the general development of alloys, consideration has been given to a goodly proportion of the known list of elements, and almost endless combinations and amounts of alloying elements have been investigated. The science of metallurgy being comparatively new, it is inconceivable that a state of perfection has been reached in the field of alloying, so that the search for new and improved alloys is being constantly pursued in many laboratories.

In the copper alloy industry, attention has lately been given to the effect in copper and copper alloys of each element of the group tellurium, selenium and sulphur, lying in the odd division of Group VI of the periodic chart of the elements. The most pronounced result of the addition of suitable amounts of these elements has been an improvement in machineability. Articles by D. E. Lawson and

By H. L. BURGHOFF Research Metallurgist, Chase Brass & Copper Co.

the author1 and by C. S. Smith2 have reported the results of some laboratory investigations along these lines and have pointed out the commercial possibilities of such alloys.

Copper is difficult to machine, not because of high hardness, but rather because of its extreme toughness. The addition of almost any of the common alloving elements, except lead, to form the copper alloys of commerce, does not improve this condition, but on the other hand usually aggravates the con-

> F particular timeliness is this article, in view of the current intense interest in the development of certain tellurium - bearing copper alloys. The author herein describes the background and work done on tellurium, selenium and sulphur additions to copper alloys, and tabulates the physical characteristics and uses of these alloys.

dition by increasing hardness with no decrease in toughness. The chips produced in the machining of such materials are long and tenuous, tending to clog tools. The highly successful and long used free-cutting copper alloys have been made possible by the addition of small amounts of lead, which is present in the structure of such allovs as discreet particles or globules. These lead particles render chips more brittle and much less continuous so that the chips are readily cleared from cutting tools, resulting in a marked increase in ease of machining.

Experimentation with the elements tellurium, selenium and sulphur appears to have been held off for many years due to the belief that their presence in copper and copper-rich alloys was definitely detrimental, with apparently no redeeming feature. Sulphur, for example, is known to cause unsoundness in tough-pitch copper, and, unless properly controlled, can cause undesirable brittleness in wrought copper-nickel alloys. The effect of sulphur on copper in the absence of oxygen has been studied by Siebe" and others, the sulphur being found to be present as copper sulphide, considered less harmful than an equivalent amount of copper oxide. With regard to tellurium, as long ago as 1881, Egleston' reported that 0.083 per

¹H. L. Burghoff and D. E. Lawson, Trans. A.I.M.E., Metals Division, 1938, 128, 315. ²C. S. Smith, Trans. A.I.M.E., Metals Division, 1938, 128, 325. ³ Siebe, Z. Metallkunde, 1927, 37, 169. ⁴ Egleston, Trans. A.I.M.E., 1881, 10, 493.

TABLE I
Properties of Copper Alloys Containing Selenium, Tellurium and Sulphur

		osition,		I	Yield Strength, b. per Sq. In.	Tensile Strength, Lb. per Sq. In	Elongation, Per Cent	Elec- trical Con- ductivity, Per Cent I.A.C.S.	
9	9.990	Cu			50,700	52,100	21.4	99.7	
0	.15 S.	balance	Cu		49,600	52,200	14.3	97.8	
0	.23 S,	balance	Cu	********************	51,400	52,500	15.0	97.6	
0	.54 S.	balance	Cu		52,500	54,300	12.1	95.1	
0	.78 S.	balance	Cu	********	56,500	56,500	7.9	91.6	
0	.97 S.	balance	Cu		53,100	56,700	8.6	90.9	
0	.11 Se	, balance	Cu		51,200	53,200	19.3	98.9	
0	.26 Se	, balance	Cu	*******************	51,600	53,000	15.7	98.0	
0	.48 Se	, balance	Cu	*******	50,900	53,600	15.7	97.4	
1	.01 Se	, balance	Cu		49,900	53,400	11.4	94.4	
1	.44 Se	, balance	Cu	********	52,000	54,200	10.0	92.0	
0	.10 Te	e, balance	Cu	*******************	50,700	53,100	15.0	99.5	
0	.25 Te	e, balance	Cu	******************	51,500	53,400	14.3	99.9	
0	.45 Te	e, balance	Cu		50,700	53,100	11.4	98.2	
1	.05 Te	, balance	Cu		51,200	53,300	10.7	97.1	
2	.42 Te	e, balance	Cu		51,100	54,600	7.1	94.5	

cent tellurium in fire-refined copper cakes rendered the copper red-short, fine cracks appearing in the cakes on the first pass through the rolls. When cold, however, this metal was said to be tough and malleable.

The occurrence of sulphur is quite widespread in nature and many metals occur in combination with it in ores. Indeed, the principal copper ores today are sulphide ores. Tellurium and selenium are also widely distributed, although not in great quantity, and commercial production of both is from anode slime deposited in the electrolytic refining of copper and lead.

Selenium exists in four modifications: a vitreous or amorphous form; two unstable crystalline or metallic forms; and one stable crystalline form, gray metallic selenium, which has a melting point of 217 deg. C., its boiling point being 690 deg. C. (423 deg. and 1274 deg. F. respectively.) Only this last form is interesting metallurgically. Commercial tellurium is a silver-white, brittle semi-metal, with melting point of 452 deg. C. and boiling point of 1390 deg. C. (878 deg. and 2534 deg. F. respectively.) Sulphur occurs in various forms, melting at about 115 to 120 deg. C., and boiling at 444.6 deg. C. (239 to 248 deg. and 832 deg. F. respectively.)

Solubility of the three elements in molten copper is limited, maximum solubility at 1200 deg. C. (2192 deg. F.) being reported by Smith² to be 18.15, 4.11, and 1.55 per cent for tellurium, selenium, and sulphur respec-

tively. In the solid state these elements are present in copper as copper telluride (Cu2Te), selenide (Cu2Se) or sulphide (Cu2S), are substantially insoluble and are reported to melt at 870 deg., 1113 deg., and 1155 deg. C., respectively. (1598 deg., 2035 deg. and 2111 deg. F. respectively.) The compounds are visible in the microstructure of both cast and wrought metal as distinct particles, as shown in Figs. 1 and 2, which show the structure of a copper-tellurium alloy containing about 0.5 per cent tellurium. As little as 0.1 per cent tellurium is readily distinguished under the microscope, occurring as particles of a bluish-gray phase.

The melting and casting of copper and copper alloys containing small amounts of these elements are accomplished without great difficulty. However, at least in the case of telluriumbearing alloys, care must be taken in melting and in preparation of molds to insure production of sound castings. Because of their low boiling points, both selenium and sulphur are best added to the melt in the form of hardener alloys, preferably their compounds with copper. No trouble is experienced in volatilization of tellurium, which has a high boiling point, and it may conveniently be added as such or in a hardener alloy.

Easily Hot Worked

Copper containing tellurium, selenium or sulphur is readily hot worked and may also be cold worked extensively, although not to the same degree as pure copper. With regard to hot working, copper containing about 0.5 to 1 per cent tellurium is quite plastic in extrusion, even more so than pure copper, so that more complex shapes and smaller sizes can be extruded than with ordinary copper. The surface of copper-tellurium material as extruded is superior, there being present much less of the shaggy bark-like surface so often encountered on extruded copper and other high copper alloys. Furthermore, less scaling due to heating is experienced. The greater high temperature plasticity of copper containing tellurium is probably allied with the plasticity of the copper-tellurium compound at the elevated temperature, and may be associated with the proximity of such temperature to the melting point, or rather dissociation temperature, of Cu2Te, which, as previously reported is 870 deg. C. It is to be mentioned that copper-tellurium has been very successfully extruded and otherwise hot worked

⁵ Milligan, "Modern Uses of Non-Ferrous Metals," A.I.M.E., Series, 1935.

TABLE II

Tellurium Content, Per Cent	Tensile Strength, Lb. Per Sq. In.	Elongation in 2 In., Per Cent	Contraction of Area, Per Cent	Relative Machineability Per Cent	Izod , Impact Energy, FtLb.
			1 er cent	1 er cene	Lineigy, re-Lin
90 per cent—10 pe	52,000	23	83	27	102
0.10	52,500	19	66	39	70
0.25	54,000	16	54	48	33
0.50	54,000	14	42	65	26
0.99	52,000	10	35	80	15
98.5 copper—1.5 pc	er cent tin series				
0	59,000	22	70	41	92
0.10	56,500	18	60	69	62
0.25	56,500	18	54	94	. 43
0.48	56,000	14	42	132	17
0.95	58,500	11	29	142	9
96 copper—3 silico	n-1 per cent zir	ie)			
0	94,000	21	65	38	71
0.25	101,000	12	40	66	24
0.45	98,500	8	24	77	12
0.68	97,500	9	30	78	6

above the reported dissociation temperature of Cu2Te.

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The effect of tellurium, selenium and sulphur upon properties of copper and copper alloys is probably best shown by delineation of properties of such materials containing various amounts of the elements in question. Smith has reported the effects of the three elements in copper, while Burghoff and Lawson' have dephase, well distributed in small particles throughout the metal so as to take advantage of its discontinuous and brittle, but not too hard, nature in breaking up chips in machining operations. This situation is similar to that in lead-bearing copper alloys, where the lead is present in minute particles scattered through the structure of the metal and operates to improve machineability.

ductility as indicated by the values for elongation in the tensile test is appreciable, but none of the alloys actually approaches a brittle condition. Electrical conductivity is only slightly diminished in each series, the actual decrease being substantially proportional to the volume of second phase formed in each alloy. With regard to machineability, ease of cutting increases rapidly for additions of each

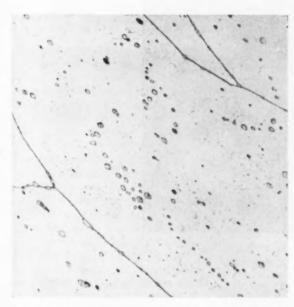


FIG. 1—Photomicrograph of 99.5 per cent copper, 0.5 per cent tellurium alloy, as cast, showing particles of copper-tellurium compound. At 100 diameters.

FIG. 2—Photomicrograph of longitudinal section of drawn rod of 99.5 per cent copper, 0.5 per cent tellurium alloy. The copper-tellurium compound is in the form of dark, elongated particles. At 100 diameters.

scribed the effect of tellurium in certain copper alloys. The principal results given in these articles will be summarized briefly here, and supplementary information, hitherto unpublished, will be included.

Useful wrought alloys do not contain more than about 1 per cent of any of the three elements, and, when they are present in amounts within this limit, tensile strength and hardness of copper and copper-base alloys are substantially unaffected, although there does appear to be a definite restraining influence upon grain growth in annealing. Ductility is reduced, although not seriously, as the amount of these alloying elements increases. Such reduction of ductility is to be expected as a natural result of the same process that improves machineability: the presence of a separate

Based upon simple laboratory tests alone, sulphur has less beneficial effect upon machineability of copper than either tellurium or selenium. The latter have much more pronounced effect, and slightly more tellurium than selenium is required to give the same apparent machineability, again as measured by laboratory test.

The tensile properties and electrical conductivity values determined by Smith for a series of alloys containing copper, tellurium, selenium and sulphur in the form of 0.5-in. diameter rods as cold drawn 36 per cent are shown in Table I.

The negligible differences in tensile strength between pure copper and the selenium and tellurium alloys are clearly evident, and it is to be noted that the sulphur-containing alloys are only slightly stronger. Decrease in of the elements up to 0.25 per cent, effect of additional increments being substantial but ever less, with no further apparent improvement beyond about 1 per cent.

In laboratory tests, the time to drill a standard hole in copper has been found to be about five times as long as in copper containing about 0.5 per cent tellurium or selenium and about 21/2 times as long as in copper containing 0.5 per cent sulphur. Laboratory saw-cut tests have shown that about 0.7 per cent tellurium in copper vields an alloy equivalent to commercial free-cutting brass, composed of 62 per cent copper, 3.25 per cent lead, 34.75 per cent zinc, for this type of cutting operation. Such tests are naturally only indicative in a qualitative sense, for other factors such as permissible cutting speed, sur-

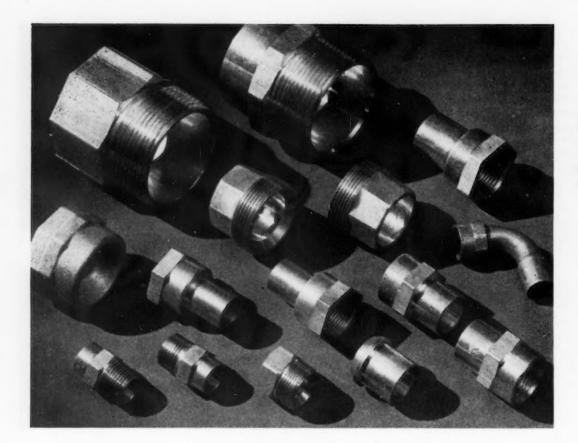


FIG. 3—Screw machine products and machined forgings made from 99.5 per cent copper, 0.5 per cent tellurium alloy.

face finish, tool life and chip form enter into the consideration of relative machineability of materials.

Ductility Adversely Affected

The influence of tellurium upon the properties of various copper alloys has been the subject of considerable study, with results in the main similar to those for copper. For example, the hardness and strength of 90-10 copperzinc, 98.5-1.5 copper-tin, and 3 per cent silicon bronze are practically independent of the amount of tellurium present, at least within the range of 0 to 1 per cent tellurium. Ductility, as indicated by elongation and contraction of area in the tensile test and by impact value, is adversly affected. Results of numerous tests on three series of alloys are given in Table II, where alloy composition is indicated in each case by tellurium content. Relative machineability, as determined by a saw-cut test, is referred to a standard of 100 per cent for free-cutting brass of similar dimensions.

It is to be noted that the machineability of the tin bronze series of alloys is increased by tellurium to a much greater degree than is the case in either the 90-10 copper-zinc or 3 per cent silicon bronze series. In connection with this variation in effect among different base alloys, it is interesting to consider the properties of tellurium-bearing copper-zinc alloys or brasses over the commercial range of zinc content. 0 to about 40 per cent. It has already been shown that the machining qualities for 0 per cent zinc (100 per cent copper) and for 10 per cent zinc alloys are greatly improved. However, a yellow brass containing 65 per cent copper and 35 per cent zinc was substantially unchanged in machineability by the addition of 0.2 per cent tellurium. The same was true for 60-40 brass containing 0.98 and 1.76 per cent tellurium, although the tellurium appeared to be present in well separated particles of a phase distinct from the normal alpha and beta crystals. Ductility and toughness were reduced as in other alloys. Table III lists the properties of this last series of alloys.

The reason for the lack of improvement of the high zinc alloys is unknown. In such alloys the tellurium obviously occurs in a separate phase as in other alloys where it does improve machineability. It would appear, therefore, that the nature of this extra phase might provide the reason for the effect or lack of effect upon machineability. Both copper and zinc form compounds with tellurium, and it is probable that in the high copper alloys a copper-tellurium compound

forms which appears to improve machineability. In the high zinc alloys it is possible that zinc is a major component of the tellurium phase and that the properties of this phase are so altered in character that the phase does not operate to break up the structure as might be expected in machining operations.

Commercial Alloys

Much has now been said concerning the merits of copper and copper alloys containing tellurium, selenium, or sulphur, and the question naturally arises as to what alloys, if any, of this group enjoy commercial application. The first such alloy to be made on a production basis was a 3 per cent silicon bronze, containing 0.25 to 0.5 per cent tellurium. This alloy possessed the high strength characteristics of silicon bronzes and the good machineability imparted by tellurium.

More recently attention has centered on a more simple alloy, pure copper plus 0.5 per cent tellurium, which is definitely past the experimental stage and has been in steady production for several months. Made in both rod and tube form, it possesses an outstanding combination of machineability, forgeability and electrical and thermal conductivity. It lends itself well to screw machine operations, being definitely

superior for such use to ordinary leaded copper, which contains 1 to 1.5 per cent lead, and also to free-cutting commercial bronze, composed of approximately 89 per cent copper, 9 per cent zinc, and 2 per cent lead. It can be machined at speeds at least 25 per cent greater than these two latter alloys, and the same tools, speeds and cutting technique are recommended as are used for free-cutting brass. Chips are very fine, and smooth and accurately finished surfaces are readily obtained.

The excellent hot working characteristics and freedom from fire-cracking of tellurium-copper provide it with additional advantages over leaded copper and also leaded commercial bronze, which have very limited capacity for hot working and which are very susceptible to fire cracking. It may be extensively cold worked, but is less ductile and tough than pure copper.

That the alloy is making rapid progress in industry is indicated by the variety of articles shown in Fig. 3. These articles consist of machined forgings and screw machine products and give some idea of uses where extensive machining, forging, high conductivity, corrosion resistance, and copper color are required in some combinations.

Still another alloy which has been developed commercially is one containing 0.5 per cent tellurium, 1.0 per cent nickel, 0.2 per cent phosphorus, and 98.3 per cent copper. This has the

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TABLE III

Properties of Tellurium-Bearing 60-40 Copper-Zinc (Brass) Rods,
1/2-In. Diameter, as Drawn 36 Per Cent

Tellurium Content, Per Cent	Tensile Strength, Lb. Per Sq. In.	Elongation in 2 In., Per Cent	Contraction of Area, Per Cent	Relative Machineability, Per Cent	Izod Impact Energy, FtLb.
0	84,500	18	54	27	28
0.98	83,500	14	31	31	10
1.76	82,500	10	23	30	7

general advantages of the coppertellurium alloy with regard to machineability and hot forging and, in addition, it can be hardened and strengthened by heat treatment. That is, it is age hardenable. The nickel and phosphorus constituents impart the property of age hardenability to the alloy, and they do so to a degree which is appreciable but not excessive, so that the alloy can be readily machined in the hardened condition. The effect of the tellurium on machineability is not impaired by the additional alloying and treatment.

The complete heat treatment of the alloy is accomplished in two steps: First, a solution or softening anneal in the range 1200 to 1600 deg. F. followed by rapid cooling; and second, a hardening treatment which consists of reheating at about 850 deg. F. for one or two hours. Rockwell F hardness is increased from about 50 in the soft condition to about 95 as agehardened. Yield strength is similarly increased from about 10,000 lb. per sq. in. to about 40,000 lb. per sq. in., and tensile strength from about 40,000 lb.

per sq. in. to about 60,000 lb. per sq. in. Electrical conductivity in the hard-ened state is about 60 per cent of that of pure copper, which is an attractively high value when considered with the accompanying high hardness and strength.

The development appears to be important in the field of forgings which must be machined and which are ordinarily in a soft condition due to the manner of their fabrication, a hot working operation. After forging, the new alloy can be hardened simply by the one heat treatment at about 850 deg. F. for a period of one or two hours. Such forgings may be machined either before or after the hardening treatment is performed.

The alloy may also be cold worked before or after age hardening so that still greater strength is obtainable. Such procedure is employed in the production of rod and tube for screw machine work and values of tensile strength as high as 75,000 lb. per sq. in. are attained, exact values depending upon the finished size of the work.

Electric Furnace Gray Iron In Germany

THE practical success and increasing application in Germany of the electric arc furnace for making cast iron was described in a recent issue of *Giesserei*, in an article by G. Sper.

The following three processes are generally used: (1) Combination of blast furnace and electric furnace, the molten iron being transferred directly to the electric furnace and there refined. (2) Combination of cupola and electric furnace, whereby the charge is melted in the cupola and the molten material treated further in the electric furnace; this method, commonly known as duplexing, is the most widely used. (3) A charge of steel and cast iron scrap is melted directly in the electric arc furnace; this is called the "synthetic" process, as C, Si and Mn are

added as ferroalloys to obtain a definite composition.

The efficiency of the electric furnace depends largely on the quality of the electrodes; the graphite electrode is preferable to the amorphous carbon electrode in spite of the higher cost of the former, according to the author; graphite electrodes are always used for furnace units of more than 6 tons.

It is also pointed out that desulphurization requires a strongly basic slag, CaO + fluorspar + coke powder. The following reactions take place in the sequence as given: FeO + Mn = MnO + Fe; MnO + C = Mn + CO; CaO + 3 C = CaC₂ + CO; MnS + CaO + C = Mn + CaS + CO; FeS + CaO + C = Fe + CaS

+ CO. CaS is insoluble in Fe. The average composition of a good electric furnace slag is 16 to 20 per cent SiO₄, 0.8 to 1.3 FeO, up to 3 Al₂O₄, 0.3 to 0.4 MnO, 55 to 64 CaO, 3 to 8 MgO, 10 to 15 CaC₂, 3 to 4 per ent S.

High quality cast iron should have low C, S and P content, pearlitic structure and fine distribution of graphite; P, however, should not be lower than 0.3 per cent as this content gives optimum mechanical properties, according to Mr. Sper. The fracture of electric cast iron is very fine-grained, uniform and dense, even in large sections. The electric furnace offers an ideal refining medium, especially for Ca-Si treatment, which is widely used in the production of "high-test" iron.

Cas vs STEEL BEHAVIOR

By GEORGE T. MOTOK

General Metallurgical Research, Republic Steel Corp., Massillon, Ohio

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REPUBLIC'S vacuum extraction process permits the steel maker to study oxidation products remaining in steel as well as determine the amounts of nitrogen, oxygen, etc. And, by these determinations an explanation can be made of variations in characteristics of steel in the same heat or from heat-to-heat, such variations not being detectable by routine chemical, metallurgical and physical tests. Herein, the author gives case histories showing correlation between gas analyses and variations in performance of welding steels, spring steels, and stainless steels. Last week, in the first section of this two-part article, mention was made of the effect of gases and oxides, and a description given of the extraction procedure.

ASE III:—This test was carried out on samples of steel cut from two plates of propeller stock, made from electric furnace steel (S.A.E. 6130) and both of the same composition.

These plates reacted differently when subjected to the atomic hydrogen torch, in what is called the "flame torch test," to determine weldability. The routine chemical analyses of these samples did not reveal definitely the causes for an apparent variation in weldability of the stock.

The chemical analysis of the samples was as follows:

Sample No. 1—0.26 C, 0.60 Mn, 0.35 Si, 0.017 S, 0.019 P, 0.92 Cr, and 0.22 Va.

Sample No. 2—0.29 C, 0.60 Mn, 0.33 Si, 0.016 S, 0.018 P, 1.00 Cr, and 0.22 Va.

The data in Table IV are the tabulated results obtained on the two samples by the vacuum-fusion process.

A study of the results shows that the best steel has a spheroidized structure and lower oxygen, nitrogen and alumina, but a higher aluminum content.

CASE IV

Samples of Mn-Si-Mo steel for coal cutter bits were tested to determine whether they would be brittle when subjected to impact testing.

The ordinary chemical analyses of the two samples showed:

Sample No. 1—0.645 C, 0.78 Mn, 0.012 S, 0.016 P, 2.10 Si, and 0.22 Mo.

Sample No. 2—0.591 C, 0.78 Mn, 0.012 S, 0.016 P, 1.86 Si, and 0.23 Mo.

Checked for fractional content of gases and oxides, these steels showed the results tabulated in Table V. According to these data, it seems that the first sample which contained a higher content of oxygen (as Al₂O₃) and nitrogen (as silicon nitride) might be affected when subjected to impact testing. (See Table VI.) And, to correlate these results with the steel making practice, it is necessary to take into consideration likewise the time intervals (in advance of tapping) at which deoxidizers were added. This information is given in Table VII.

The relationship may be explained as follows:

- (1) In every steel there is a certain amount of oxygen as FeO in the molten mass before any deoxidation takes place.
- (2) Adding Mn to the steel mass deoxidizes the steel to some extent, and most of the manganese oxides which are formed will proceed to rise to the top into the slag. This diffusion from steel to slag depends upon the time allowed for the inclusions to be eliminated. To both heats, in the foregoing tests, there were added the same amounts of manganese, but the time interval, in addition to tap, is less in the one heat than in the other, and the effect of this shorter interval of

H; Ni

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time may be seen in the greater amount of manganese oxide which is left in the steel.

- (3) The same conditions prevail with deoxidation with silicon.
- (4) The most convincing indication is to be observed in the case of the aluminum addition. Practically the same percentage of aluminum was added to both heats, but the heat to which aluminum was added at the tapping time retained more aluminum oxide inclusions than the heat to which the aluminum was added 65 min. before the tapping time.

There appears to be no appreciable difference in the amounts and the distribution of the hydrides in both steels. However, in the case of the nitrides it was found that one heat contained more total nitrogen than the other. It is known that ferrosilicon additions to the steel mass retain large amounts of nitrogen as silicon nitride. The silicon nitride is dissociated in vacuum at temperatures in the neighborhood of 2800 deg. F. Hence, in the case of these two steels, the nitrogen appearing as silicon nitride was extracted at 2900 deg. F.

The oxides and gases differed in amounts, the steel which was claimed to be brittle containing higher aluminum oxide inclusions and higher silicon nitride content than a good steel should.

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The kind of deoxidizers, and the time of addition before tapping, are both important factors in making steels of the desired quality. The kind and the amount of the oxides formed on deoxidization, as well as the elimination of these oxides, may be readily ascertained by the vacuum-fusion method of extraction.

CASE V

Of two spring steels of similar chemical composition, and treated in the

TABLE IV

Results of Vacuum Extraction of Gases and Oxides

(Total Per Cent)

Sample N (Good Welds	o. 1 ability)	Sample No. 2 (Poor Weldability)
Oxygen	0.0049	0.009
Hydrogen	0.0003	0.0002
Nitrogen	0.005	0.014
Al	0.050	0.035
1A2O3	0.016	0.026

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DUPLEX iron manganeseoxide inclusions in rimming steel; nital etch, at 500 diameters.

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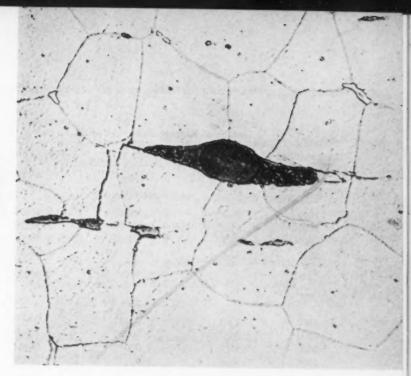
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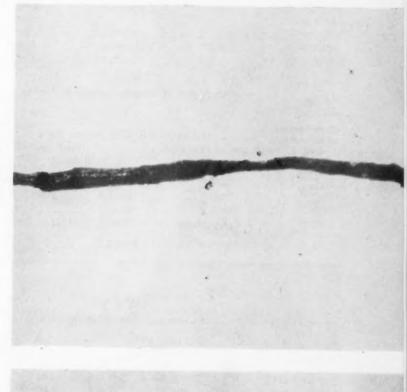
RON-manganese-silicate inclusion in siliconkilled steel; aspolished, and at 250 diameters.

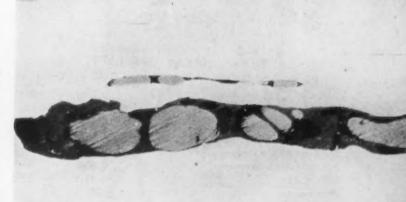
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DUPLEX iron — manganeses ilicate (dark gray) and ironmanganese-sulphide (light gray globules) in high-sulphur silicon-killed steel; aspolished, and at 250 diameters,







0 0

TABLE V
Results of Vacuum Extraction of Gases and Oxides

Temperature	Probable Oxides		Per Cent	
of Extraction, Deg. F.	Reduced	Oxygen	Hydrogen	Nitrogen
		Sample No. 1		
1900	FeO	0.00081	0.00003	0.0014
2200	MnO	0.00054	0.00010	0.0014
2500	SiO ₂	0.00136	0.00007	0.0009
2900	Al ₂ O ₃	0.00434	0.00010	0.0057
Total		0.00705	0.00030	0.0094
		Sample No. 2		
1900	FeO	0.00122	0.00004	0.0005
2200	MnO	0.00092	0.00004	0.0016
2500	SiO ₂	0.00092	0.00011	0.0016
2900	Al ₂ O ₃	0.00275	0.00007	0.0037
	Total	0.00571	0.00026	0.0074

TABLE VI
Distribution of Oxygen Content as Oxides

		Per Cen	t Oxides
Temperature of Extraction, Deg. F.	Oxides	Sample No. 1 (Poor)	Sample No. 2 (Good)
1900	FeO	0.00364	0.00548
2200	MnO	0.00239	0.00407
2500	SiO ₂	0.00254	0.00172
2900	Al_2O_3	0.00925	0.00585
	Total Oxides	0.01782	0.01712

TABLE VII
Time Intervals For Adding Deoxidizers

		Per Cent Add Before Tappi			er of Minu	
	Mn	Si	Al	Mn	Si	Al
Sample No. 1	0.50	2.13	0.034	80	35	At tap.
Sample No. 2	0.50	1.87	0.035	55	45	65

TABLE VIII

Physical and Mechanical Properties vs. Gases and Oxides in the Two Samples

	Sample No. 1	Sample No. 2
	(Poor)	(Good)
Per Cent FeO inclusions	0.0036	0.0055
Per Cent MnO inclusions	0.0024	0.0041
Per Cent SiO ₂ inclusions	0.0025	0.0017
Per Cent Al ₂ O ₃ inclusions	0.0092	0.0058
Izod, ftlb.	37.0	67.0
Rockwell C	56.5	56.5

same manner, one far surpassed the other when, in ½-in. radius springs, they were tested to destruction on a 500-ton press. In routine inspection tests, both steels had appeared to be the same in performance possibilities. The springs were made as follows:

Heated to 1650 deg. F.

Air cooled.

Reheated to 1500 to 1525 deg. F.

Oil quenched with Houghton No. 2 oil.

Drawn at 800 deg. F.

The specified analysis and the actual analyses of the two samples were as follows:

Specified analysis; 0.90 to 1.10 C, 0.30 to 0.50 Mn, 0.05 P, 0.05 S, 0.20 max. Si, and Cr and Va nil.

Sample No. 1: 0.90 C, 0.41 Mn, 0.024 P, 0.036 S, 0.08 Si, 0.13 Cr, and Va nil.

Sample No. 2: 0.87 C, 0.40 Mn, 0.024 P, 0.037 S, 0.09 Si, 0.03 Cr, and Va nil.

Checked for fractional content of gases and oxides, these steels showed the results tabulated in Table VIII.

And also, from the results shown in Table IX it becomes obvious that the considerably greater amount of gases and oxides in Sample No. 2 over Sample No. 1 accounts for the difference in behavior of the two steels, although the routine chemical and physical tests did not disclose any reason for such a difference.

Considering the individual oxides we find that Sample No. 2 contained large amounts of MnO, SiO₂, silicates, and Al₂O₃, indicating that somewhere during the making of the heat a lot of deoxidation products were left in the steel.

CASE VI

Finally, consider the results of tests on samples of four stainless steels. Three of the stainless steels had the regular mill carbide solution treatment. The fourth sample had been slightly cold rolled but had previously been given a solution treatment.

Routine heat analyses did not indicate any significant differences that might account for the pitting which was encountered with all four of these stainless samples. Because the ratings of the steels are so little affected by surface treatment and because of the lack of correlation between previous analyses and the ratings, the possibility of the influence of non-metallics on pitting prompted the undertaking of the fractional vacuum-fusion determination.

The ordinary chemical analyses of the four samples were as follows:

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Sample No. 1—0.06 C, 0.41 Mn, 0.016 P, 0.009 S, 0.41 Si, 10.55 Ni, 18.75 Cr.

Sample No. 2—0.065 C, 0.43 Mn, 0.018 P, 0.011 S, 0.39 Si, 9.00 Ni, 18.42 Cr.

Sample No. 3—0.05 C, 0.49 Mn, 0.017 P, 0.014 S, 0.36 Si, 9.27 Ni, 18.15 Cr., 0.13 Ti. Sample No. 4—0.09 C, 0.48 Mn, 0.016 P, 0.010 S, 0.45 Si, 8.97 Ni, 17.92 Cr.

Checked for fractional content of gases and oxides, these stainless steels showed the results tabulated in Table X.

From the vacuum-fusion extraction of gases and oxides, it may be noted that the total oxygen content is higher in the first two stainless steels tested, steels which offered the greater resistance to pit corrosion. Considering only the total content of oxygen vs. pit susceptibility, however, it seems unlikely that a comparatively high total oxygen should prevent pit corrosion. A more likely interpretation would be on taking the results obtained for the content of oxygen occurring as Cr₂O₃.

Here, it is found that the first two steels are higher in oxygen as Cr₂O₃ than the third and fourth steels. Therefore, a pit corrosion resistance might be associated with the presence of chromium oxides.

Chromium nitrides, which are also dissociated at the same temperatures with the chromium oxides, are higher in the first two steels than in the third and fourth. It seems equally credible, therefore, that the oxides and nitrides of chromium, by forming an oxidenitride film on the grain surface do minimize the susceptibility to corrosion.

Conclusion

Results such as the foregoing obtained by means of the vacuum extraction method throw a new light on the steel making process. It permits the steel maker to study the oxidation products which remain in the steel and to check those elements such as nitrogen, oxygen, etc., which it is more and more recognized do have an important effect on the characteristics of the finished steel.

The problem of the steel maker, therefore, is (1) to determine the underlying metallurgical causes for the different characteristics of the steel which are not explained by the ordinary chemical and physical tests, and (2) to apply the knowledge so acquired as systematically as possible to every detail of the steel making process, with the object of producing steel that will be uniform throughout the heat, as well as from one heat to the next.

TABLE IX
Results of Vacuum Extraction of Gases and Oxides

T		Spring	Steel, Samp	le No. 1	Spring	Steel, Samp	le No. 2
Temperature of Extraction, Deg. F. 1960	Oxides Reduced Free O ₂	Oxygen	Hydrogen Per Cent	Nitrogen	Oxygen	Hydrogen Per Cent	Nitrogen
	and FeO	0.00908	0.000936	0.00590	0.00259	0.000016	
2140	MnO	0.01259	0.000855	0.00169	0.00246		0.00023
2410	SiO ₂	0.01945	0.000842	0.00212	0.00621	0.000016	
2860	Aluminum silicates	0.02404	0.000536	0.00853	0.01200	0.000143	0.00245
3000	Al ₂ O ₃	0.03060	0.000324	0.00908	0.01030	0.000115	0.00338
	Total	0.09576	0.004293	0.02732	0.03356	0.000290	0.00606

	Dogulto of Voc	TABLE X	Gases and Oxides		
	Results of vac				
Temperature	Probable	SAMPLE NO.	Per Cent by Weight		
of Extraction,	Oxides				
Deg. F.	Reduced	Oxygen	Hydrogen	Nitrogen	
2100	FeO	*****		0.0026	
	MnO and SiO ₂	0.00186	0.00008	0.0039	
2600	SiO ₂	0.00445	0.00013	0.0072	
2900	Cr ₂ O ₃	0.00445	*****	0.0202	
To	tal	0.01076	0.00022	0.0339	
Pit susceptibil	ity characteristics:-	-	Weight Loss In. Mg.	No. of Deep Pits	
			4.8	2	
_		SAMPLE NO.			
Temperature of Extraction,	Probable Oxides		Per Cent by Weight		
Deg. F.	Reduced	Oxygen	Hydrogen	Nitrogen	
2100	FeO		0.00005	0.0064	
2400	MnO and SiO ₂	0.01840	0.00010	0.0150	
2600	SiO ₂	0.00490	0.00031	0.0172	
2900	Cr ₂ O ₃	0.00612	*****	0.0350	
Total		0.02942	0.00046	0.0736	
Pit susceptibility characteristics:—			Weight Loss In. Mg. 6.9	No. of Deep Pits	
		SAMPLE NO.			
Temperature	Probable		Per Cent by Weight		
of Extraction, Deg. F.	Oxides Reduced	Oxygen	Hydrogen	Nitrogen	
2100	FeO	Oajgon	0.00010	0.0090	
2400	MnO and SiO ₂	0.00129		0.0008	
2600	SiO ₂	0.00258	0.00005	0.0068	
2900	Cr ₂ O ₃	0.00258	0.00021	0.0082	
To	tal	0.00645	0.00036	0.0248	
Pit susceptibil	ity characteristics:-	name .	Weight Loss In Mg.	No. of Deep Pits	
		SAMPLE NO.	99.6	59	
Temperature	Probable		Per Cent by Weight		
of Extraction,	Oxides Reduced	Owner	Hydronen	Nitrogen	
Deg. F. 2100	FeO	Oxygen	Hydrogen 0.00005	0.0044	
2400	MnO and SiO ₂	0.00085		0.0007	
2600	SiO ₂	0.00297		0.0022	
2900	Cr ₂ O ₈	0.00170	0.00021	0.0052	
To		0.00552	0.00026	0.0125	
	ity characteristics:-		Weight Loss In. Mg. 140.7	No. of Deep Pits 110	

PORCELAIN ENAMELED FACTORY BUILDING

As a demonstration of the versatility of its own product, the Ferro Enamel Corp., Cleveland, recently completed a new factory building, unique in that porcelain enamel is used as an exterior as well as interior finish.

The roof, stack, gables, trim, gutters, window-sash and door are finished in porcelain enamel, and inside partitions separating the offices, laboratory and plant are also in porcelain enamel. The objectives in constructing the building of this material were first, to demonstrate the possibilities for porcelain enamel in the factory-building field and, secondly, to take advantage of savings to be made through

the use of the company's own product.

The roof is believed to be the first self-supporting porcelain enameled steel roof ever erected, and for that reason has attracted considerable interest and favorable opinion from builders. It was found that the Kor-Lok system, developed by the Kor-Lok Co., Cleveland, offered an ideal means of handling enameled roofing. This system makes use of a patented interlocking formation which eliminates all exposed bolt holes for fastening the sheet to the roof deck. All bolt heads are concealed and protected by the overlapping sheet.

This type of sheet permits the erection of the main portion of a roof, or siding area, with standard-size sheets. No punching of holes is required. For the balance of a roof or siding area, the sheets can be cut to size prior to porcelain enameling. It is also practical to ship standard sized sheets to a job and then do any necessary cutting to size with a small power saw. Since only a thin coating of porcelain enamel is used, no serious chipping of the enamel along such cut edges results.

For the building shown in the accompanying photo the sheets that were not standard size were cut to size before porcelain enameling. It is believed that for the average industrial roofing job, this practice is feasible and desirable, although not essential.

Where the underside of the roof is not covered by a secondary facing material, such as plywood, celotex board or similar material, it is possible and quite desirable to coat the underside of the sheets with white porcelain enamel. This increases the cost slightly, since two firing operations are then required, but the advantages gained more than compensate for the difference.

White light reflectance values of 70 to 75 per cent can be obtained in this way. To clean such a roof, it is only necessary to wash it down with water and perhaps a little soap.

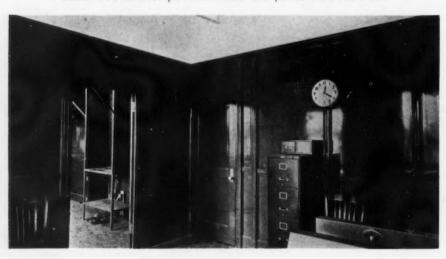
An increasing field is anticipated by the company for porcelain enameled roofing, now that the first practical industrial installation of 7000 sq. ft. has been made. This type of roofing should be of particular interest to those industries where process-fume conditions are severe on the more common types of roofing.

The steel partitions in the plant, shown herein, were finished in a rich shade of brown porcelain enamel and were made by the E. F. Hauserman Co., Cleveland. This installation is considered a practical demonstration of the feasibility of porcelain enameling standard metal partition units for offices, stores and laboratories. Easily cleaned, requiring no periodic refinishing, these partitions are expected to retain their quality of "newness" indefinitely.

All of the industrial window-sash for the building were porcelain enameled, using a black ground coat with a black overspray, to produce a fine textured, tight enamel finish, resistant to action of the most severe weather. The flanges buried in the wall also have this permanent protection against corrosion from the dampness that often collects there.



THIS new Ferro Enamel Corp. building has porcelain enameled roof, sash, gables, trim, gutters, window sash and door. The interior partitions also are porcelain enameled.



44-THE IRON AGE, December 7, 1939

Metals FOR ELECTROPLATING

PRINCIPAL requisite for a good electroplate is a clean surface. Surfaces which appear clean to the naked eye may not be clean at all, but may be covered with very thin films of oil, grease, fat, oxide, etc. This contamination readily defeats the operation of plating. In other words, the surface to be plated must be chemically clean.

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To obtain a clean surface several operations are necessary. First the surface oils, greases and fats, as well as the dirt accumulations due to handling, must be removed. Second, the oxide film, from whatever cause, such as rolling mill scale, fire scale, rust, tarnish, etc., must be removed. Cleansing materials which readily remove the first group are not adaptable to the removal of the second group, and the acids ordinarily used to remove the second group are not efficient on the first group. The process, therefore, involves two distinct cleaning operations.

The first operation of cleaning is essentially a degreasing operation. In Fig. 1 is shown an installation of a degreaser for use on the first group of materials. Its use is distributed over the following cleaning jobs:

- (1) Removal of rolling and rustproofing oils before plating from sheet stock, rolled forms, shapes, drawn tubes and other mill products which are oil protected against rust and tarnish during shipping.
- (2) Removing stamping and cut-

The why and how of chemically cleaning different types of metals and alloys prior to electroplating or application of other high grade finishes. The equipment used and the characteristics of the various techniques.

By C. C. HERMANN and R. W. MITCHELL*

ting oils prior to bright dip and prior to polishing and buffing. If these are not removed, bright dipped parts will be non-uniform in color. Polishing and buffing wheels become loaded with the oils and cause smudging of the work, reduce the cutting rate, are more difficult to wipe, and shorten wheel life.

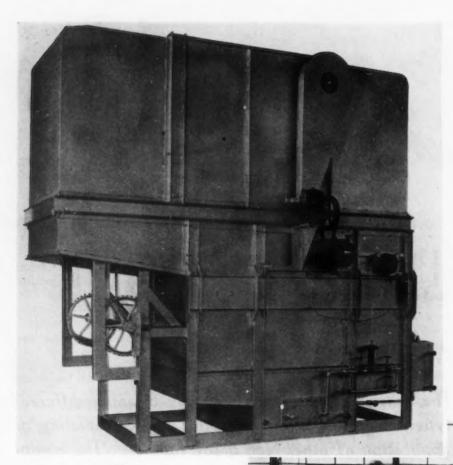
- (3) Removing stamping, cutting and drawing oils prior to plating in order to keep subsequent solutions such as alkali cleaners, acid pickles, cyanide dips and plating solutions free of the oil contamination.
- (4) Removing stamping oils from pre-plated stock after stamping and forming. Many articles, such as nickel used for vanity 'cases, are stamped and formed after plating and the use of oil on the dies avoids streaks.
- (5) Removing oils from tightly woven wire cables prior to plating,

such as the cable used for the eye glass temple frame.

- (6) Removing stamping, drawing and cutting compounds from aluminum prior to coloring or anodizing.
- (7) Removing quenching oils, and lapping and buffing compounds from work prior to plating.

Although just a portion of the applications of cleaning are mentioned the reader is, no doubt, quite able to think of many others. The degreaser shown in Fig. 1 is equipped with a two-strand, cross rod conveyor with variable speed drive. Heat is supplied by steam coils to maintain the vapor at a temperature of 188 deg. F. The work being conveyed through the machine is vapor cleaned while passing over the dirty boiling liquid. The work then passes under pressure sprays of clean solvent which is slightly cooler than the vapor. The

^{*}Technical director of Magnus Chemical Co.



between 70 and 150 deg. F., the high temperature being preferred. In the case of sulphuric acid, which is considerably cheaper, the concentration should be between 5 and 15 per cent, and the temperature of the bath between 120 and 200 deg. F.

The Hanson-Van Winkle-Munning Co. electrolytic bright dip process specifies the bath to be 10 to 20 per cent sulphuric acid at a current density of from 10 to 150 amp. per sq. ft., the work being made the cathode. The scale is effectively removed in from 3 to 4 min., but the work will be coated with an "acid black" or smut. To remove this smut the work is removed, rinsed in cold water and placed in a stronger acid bath where the work is made the anode for a period

BELOW

FIG. 2 — Cleaning aluminum parts at Hall Aluminum Air Craft Co.

ABOVE

FIG. I—Degreaser equipment of the vapor type. Courtesy Detroit Rex Products Co.

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vapors are condensed on the work, due to the difference in temperature of the work and the vapor, to give a final cleaning.

The overall dimensions of the equipment are 12 ft. 4 in. long by 5 ft. 4 in. wide and 11 ft. 6 in. high. The solvent capacity is 50 gal.

The rate of production is from $1\frac{1}{2}$ to 2 tons of miscellaneous metal parts per hour at a conveyor speed of $7\frac{1}{2}$ ft. per min. Parts are loaded and unloaded from the degreaser at the end of the machine. However, the conveyor may be made a part of a general system covering the entire series of operations in the plating cycle as well as extend back to preceding operations. Under average conditions the degreaser uses 3 gal. of liquid per 8-hr. day.

The second operation of cleaning is essentially a descaling operation. The scale may be rolling mill scale, fire scale, heat treating scale, sand scale, rust or oxides from whatever source.

There are numerous ways of removing this deposit, the selection of which depends upon the type of work, its composition and surface contour. Some of the more common ways employed are grinding, honing, rubbing, polishing, roughing, dry finishing, buffing, sand-blasting, tumbling, sanding and pickling. In the present work, consideration will be confined to clean-

ing in the electric bath.

When descaling with hydrochloric acid, a concentration of about 7 per cent will act quicker where rust is present. The bath should be heated

of time ranging from 30 sec. to 1 min. In this bath the acid is made from 40 to 50 per cent and the current density from 100 to 150 amp. per sq. ft.

In this system high current densities coupled with low temperatures—up to 90 deg. F.—produce good bright surfaces. With too low current density or too high temperature the surface will be clean but not bright. The normal results from the process are a silvery surface free from smut and with a slight degree of etching. The high current values require good electrical contacts and in many instances

cooling of the anodic bath is needed to insure a bright surface.

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In the complete automatic plating system an alkaline cleaner is usually inserted preceding the cyanide bath to remove the cutting oil, greases and dirt from the surface. A cleaner with 35 to 50 per cent caustic soda, the balance being silicate and phosphate, may be used. No soap should be present as this interferes with the conductivity of the solution, and, furthermore, soap will cause trouble if dragged over into the plating cycle.

For die cast work, where a slightly etched surface is desired for adherence of the plate, about 10 per cent of free caustic soda should be added to the mixture of silicate and phosphate. The silicate in this case acts as a buffer agent. If the etched surface is not desired, the caustic soda is omitted. Unless the work is adequately buffed with sodium silicate, excessive tarnishing and etching of the work will result. German silver, antimonial lead, white metal, Brittania metal, terne plate, and zinc such as used in the manufacture of novelty jewelry and similar work are handled in the same manner as above. For silver and brass, the procedure is the same as for copper articles except that the alkaline mixture should run between 15 and 25 per cent caustic soda. It should be buffed with some silicate and should be made free-rinsing by the addition of phosphate.

The cleaning and stripping of aluminum is of particular interest to the aircraft industry, and in fact this industry has gone to enormous expense in materials, methods and equipment to improve this phase of their operations. It has long been known that

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weather aged aluminum takes a paint well, that is, the bond between the paint and the aluminum sheet was quite firm. Since paint would not bond to the dead smooth surface of the new aluminum, some method was sought which would give teeth to the aluminum.

Aluminum workers turned to the steel industry and the experience available with iron oxide. The iron oxide was applied to the aluminum sheet and baked, then removed by varnish remover and the surface found to be etched sufficiently to provide a bond between the paint and the surface. Another primer, zinc chromate, was used and was found to have a greater protective value than the iron oxide and possessed the added feature of not having any reaction with the aluminum surface as does iron oxide.

Another problem presented to the aluminum users was that of removing the paint. In the aircraft industry the complete removal of the paint was a matter of great importance. A new plane design must be painted, and after its trial runs all of the paint must be removed right down to the metal and a new coat applied. Here was a cleaning job of no small proportions.

It was found that a soap addition of 1 per cent for cleaning aluminum in a hot bath (200 deg. F.) resulted in the formation of an insoluble soap,

if ordinary fatty acid soap was used. Since most water contains soluble calcium and magnesium salts, which immediately react with the ordinary soap to give insoluble calcium and magnesium soap, a synthetic soap was evolved. By combining this synthetic soap with the compounds formerly used, and based on tri-sodiumphosphate and soda ash, the phosphate being buffed with silicate to prevent excessive etching of the aluminum surface, all the troubles previously experienced were overcome and the aluminum surface was properly prepared for the paint coat.

Fig. 2 shows the bath used at the plant of Hall Aluminum Air Craft Co., Bristol, Pa. The tank is 4 x 8 x 16 ft. and contains approximately 3500 gal. of solution. The average consumption of cleaner for this operation is 25 lb. per month. The bath is kept at a temperature of from 140 to 150 deg. F., and aluminum is cleaned in 5 min. Paint is removed in from 15 to 30 min. Original concentration is 4 oz. per gal. of water.

Before leaving the general subject of cleaning by the use of solutions other than alkaline, some mention should be made of some of the solvent or emulsion cleaning processes. These are used to remove the bulk of the oil, grease and other foreign matter prior to immersion in an electric cleaning bath and to soften and remove oils unattacked by alkaline solutions, as for instance sulphurized and chlorinated oils, pigmented drawing compounds, metallic soaps, etc. The work is immersed in a liquid solvent or emulsion, usually at room temperature, which penetrates the oil film and, after draining, it is rinsed which in turn causes spontaneous emulsification to take place. The oil, dirt and smut is then readily removed in subsequent cleaning operations, and for that matter is often largely carried away by the rinse water. The use of this method is illustrated in Fig. 3, in which the third tank back is the electric cleaning tank, the tank adjacent is the spray rinse tank, and the near tank is the electric cvanide tank. The system used is entirely automatic in operation. This is a feature that is coming more and more into general use in line production plants and, when coupled with

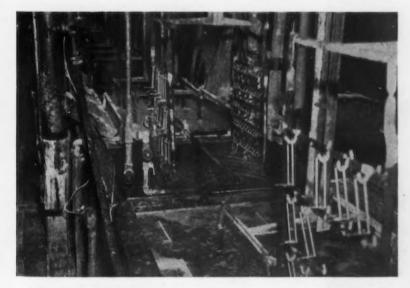


FIG. 3—An installation for solvent or emulsion cleaning of metals.

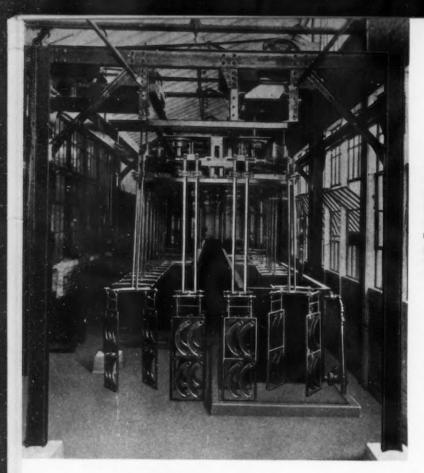


FIG. 4 - Automatic plater of the "straight line" type incorporating continuous cleaning and plating. Courtesy Hanson-Van Winkle - Munning Co.

adequate ventilation, may be incorporated in the production lines. Of particular note in this respect are the larger plants manufacturing washing machines and similar products.

In Fig. 4 is shown a large automatic plater in operation. This is the so-called "straight line" conveyor type manufactured by Hanson-Van Winkle-Munning Co. It is provided with two conveyor chains, one on each side of the conveyor, operating parrallel. The drivers of two chains are synchronized through a common shaft

receiving power from an electric tanks being arranged in a single line. transfers by chains provided with lifting knobs, properly spaced to provide is made through drum fingers. These

motor driving through a gear reducer. The transfer units, one on side, are located at the tank intersections, the The work racks are carried over the accurate timing and operating at a predetermined speed with the conveyor chain. The guide rail is provided with a cathode bar attached and the contact between the work and the cathode bar

FIG. 5 - Automatic plater of the "dwell" type. Courtesy Han-son-Van Winkle-Munning Co.

machines are rather costly as regards first cost and installation, the amount depending on the size and capacity. However, it is claimed that such installations have so far justified such cost through savings effected.

In Fig. 5 is shown the "Dwell" type conveyor made by the same firm. In this system all work moves forward step by step at the same time. In both conveyor systems the work is supported on specially designed carriers or hangers and the tanks are of such size and design that the work may be raised or lowered into the bath without dislodging the work or requiring manual assistance.

Recently there has been devised a new and, in many respects, a better method for cleaning metal surfaces for electroplating or other finishes. It involves a slightly different method from those so far described, utilizing a new type of cleaning agent of superior effectiveness. This is an alkaline cleaner and is made up with wetting and dispersing agents of the sulphonic acid type. These materials have extremely rapid wetting, penetrating and dispersive effects. They provide more rapid, more thorough cleaning. They are acid and hard water-proof and can form no troublesome scum by drag-over. They are very free rinsing by reason of the low surface tension of the solutions; hence succeeding rinses and dips are kept free of contamination.

They are used at high concentration and high current density with reverse current. The work should be anode (except with die cast metal, zinc, aluminum or other soft metal, in which case the work should be cathode.) The usual electrocleaning equipment with steel tank and plate steel cathodes suffices. The best practice is to use cathodes of perforated steel nickel

Steel or copper surfaces can be completely cleaned, in the one electrocleaning operation, of polishing or buffing compound, almost all drawing compounds, smut, finger marks and shop dirt. Degreasing, precleaning. scrubbing or hand wiping are usually rendered unnecessary by this method, which is particularly advantageous before bright plating.

The solution should be maintained at 12 to 16 oz. per gal. and operated at close to the boiling point. The current density should be 40 amp. per sq. ft. Cleaning time varies from ½ to 3 min., depending upon amount and kind of contamination present. This

(CONCLUDED ON PAGE 88)

Control of SULPHUR IN BASIC OPEN HEARTH

By T. L. JOSEPH and F. W. SCOTT*

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FTEN it has been mentioned that non-metallic inclusions have an effect on physical properties of steel. But, this report gives quantitative data on the specific effects of such inclusions. The first two sections of this report, published Nov. 23 and 30, showed inclusions found in slabs and sheets, the effect of sulphur on grain size and physical properties, and also the sources of sulphur in the open hearth. Herein, in the last section, the authors give factors affecting desulphurization in steel, relationship of sulphur in bath at melt-down and at tap, chemical equivalent of sulphur in open hearth, etc.

ACTORS affecting desulphurization of steel:-A general study was made of the factors affecting desulphurization in the open hearth over a period of five months. During each month, 40 strip heats were selected to follow the trends in open hearth practice. These heats were made in 50-ton furnaces, fired with a mixture of oil with tar, and coke oven gas. The slag samples analyzed were taken just before the spiegel addition. As very close restrictions on the type of scrap which was used in these heats was maintained, it was felt that the sulphur content would be fairly constant and was not checked in the study.

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The graph shown in Fig. 17 gives the relationship between the removal of sulphur from the bath, the slag analysis, and the amount of high sulphur coke oven gas used. The average values of the variables studied for each month are plotted on the graph. In the case of the sulphur-elimination curve, the points represent the difference between ladle sulphur and the hot metal sulphur, divided by hot metal sulphur. Each point plotted represents the average for the month, and no other points, selected at random, have any particular value.

With the exception of the month of

July, the per cent of sulphur elimination is related to the FeO and the MnO in the slag, its basicity and the sulphur content. In July, the variation in the amount of coke oven gas in the open hearth fuel became the most important factor as the amount of gas used was increased decidedly at that time. The increase in the per cent of sulphur in the slag during this month would normally indicate an increase in sulphur elimination. However, the increase in use of coke oven gas from 1300 to 2700 cu. ft. per ton of steel produced increased the amount of sulphur in the system.

The CaO/SiO₂ ratio decreased steadily from the point of greatest sulphur elimination reached in the month of April. With decreasing basicity, the MnO, FeO, and sulphur in the slag decreased and the sulphur in the finished steel increased.

The results from this study showed the complexity of the problem and the need for a close study of the factors affecting desulphurization. For instance, it was decided that quantitative data on the sources of sulphur would be particularly helpful. The effect of slag volumes, and the temperature should also be determined, and the rate of desulphurization of the bath, and its relationship to the slag analysis should likewise be studied. The results of such a study

are given in the accompanying tables and graphs.

Twenty-three heats were observed and frequently sampled during the working period. The samples of slag and metal were completely analyzed, and the data studied to isolate insofar as possible the factors affecting the sulphur in the finished steel.

An effort was made to determine the relative amounts of sulphur from different sources. The sulphur in the materials charged was of primary importance. The limestone contained an average of 0.037 per cent sulphur and came from the stock pile. The amounts of sulphur from this source vary only as the weight of the limestone charged. Selected heavy melting railroad scrap with a fairly constant sulphur content was used. The hot metal was sampled carefully and showed normal variations from one addition to the next. Fuel, the fourth source of sulphur, varied as the amount of coke oven gas used in conjunction with the fuel oil charged. This variation was reflected in the amount of sulphur picked up by the bath during the melting of the scrap.

As stated previously, steel scrap exposed to the action of the gases during melt-down in the open hearth absorbs sulphur in proportion to the amount of sulphur in the gas and in the scrap. If the scrap is high in sulphur, and the gas low, sulphur may be lost to the gas. If the scrap is low in sulphur, and the gas high, then sulphur may be absorbed. (See Table VII, last week.)

The first bath of molten scrap is covered with a high sulphur slag consisting of iron silicates and oxides. When the hot metal is added, the carbon, manganese, and phosphorus are increased and the sulphur content may either be raised or lowered. The iron oxide in the oxidized slag decreases

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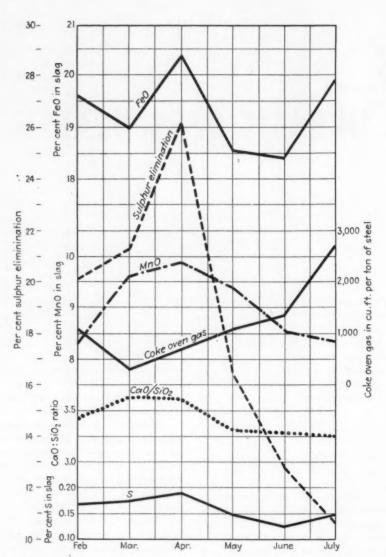


FIG. 17—Relationship between elimination of sulphur, fuel and slag analysis in the basic open hearth.

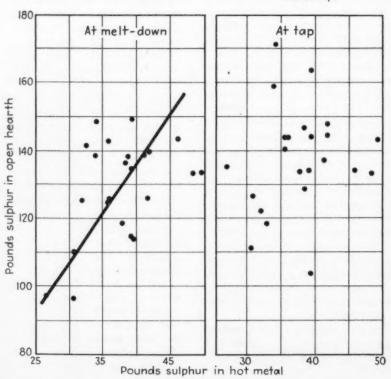
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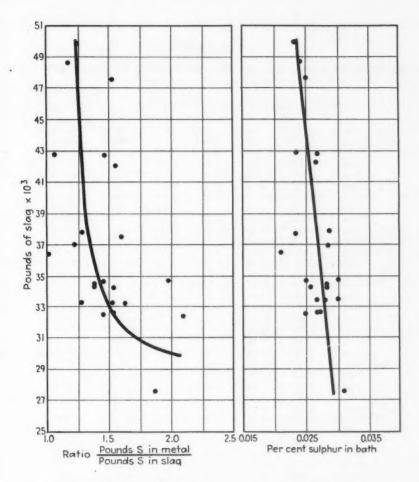
rapidly due to the vigorous reaction with the hot metal. Shortly after the addition of hot metal, the lime starts to come up and form a more basic slag. The first immature slag is a viscous mass of calcium oxide mixed with iron and manganese silicates. The free lime continues to absorb sulphur from the gas at a rapid rate, and as the free lime combines with the silica, it frees the iron and manganese oxides which are dissolved in the calcium silicates. At this point, about 5 hr. before tap, the first bath tests were taken. Others followed at approximately hourly intervals.

The slag volume was calculated from the weight and per cent of manganese in the slag. The total weight of sulphur in the system was determined from the sulphur content and the respective weights of slag and metal. The ratio in Table IX was obtained by dividing the weight of sulphur in the metal by the weight of sulphur in the slag. In this way, the authors were able to take into account the desulphurization of the bath by the slag, although the per cent sulphur in the slag may decrease towards the end of the heat, when the rate of desulphurization is greatest. This decrease in the per cent of the sulphur in the slag is due to the rapid increase in slag weight. Additional lime from the bottom and increasing amounts of iron oxide tend to dilute the concentration of sulphur.

The total sulphur in the bath at various stages of each heat is given in Table IX. The column under test No. 1 gives the pounds of sulphur in the system at melt-down. Although the sulphur in the hot metal varied over a rather narrow range, the increase in per cent of sulphur in the iron is reflected in the amount of sulphur in the bath at melt-down. As shown in Fig. 18, higher sulphur in the hot metal tends to increase the total sulphur in the system appreciably. This relation is not as pronounced as it might be because only a minor part of the total sulphur originates in the hot metal.

FIG. 18—Pounds of sulphur in the hot metal and pounds of sulphur in the open hearth bath at melt-down and at tap.





In most cases, the total sulphur in the system increases as the heat progresses. At melt-down, the gas phase and the slag are far from equilibrium. As the refining period progresses, the character of the slag changes and equilibrium is approached more closely by the time the heat is ready to tap. The data in Table IX, and the graph in Fig. 18, show no relationship between the amount of sulphur in the hot metal and the final sulphur content of the bath. This is in agreement with the observations of Diehl, Maxwell and others.

When the scrap is melted, and the slag formed, the sulphur in the metal bath will tend to enter the slag until equilibrium is reached. If the sulphur in the slag is less than 3.7 times per cent of SO2 in the gas, sulphur will, according to Herty, be absorbed by the slag from the gas phase. These processes continue until the slag and gas phases reach equilibrium, and no sulphur enters the slag from the gas phase. If the slag is still not saturated with sulphur in regard to the metal. sulphur will continue to pass from the metal into the slag. As this additional sulphur enters the slag, the concentration in equilibrium with the gas is exceeded and sulphur will pass from the slag to the gas. The system metalslag will accordingly lose sulphur. When the concentration of sulphur in the slag is below the amount in equilibrium with the gas, sulphur will pass from the gas into the slag. In this case the additional sulphur in the slag will force more sulphur into the metal. In the final analysis, the sulphur in the gas phase controls the sulphur in the finished steel.

The conditions with respect to sulphur control vary somewhat from day to day. In some cases, it is seen from Table IX that the system contained more pounds of sulphur at melt-down than at tap. This indicates, of course, that sulphur in the charge was absorbed by the gas and removed from the system. This loss of sulphur to the gas lowered the amount in the bath and favored the production of low sulphur steel. Thus, the SO₂ in the gas becomes the limiting factor in controlling the amount of sulphur in the steel.

In other cases, the pounds of sulphur in the bath increased steadily from melt-down up to the time of tapping. This indicated that the sulphur in the charge, plus that absorbed during the melting of the scrap, was so low that the sulphur in the slag was less than the equilibrium value for the slag-gas system. The slag accordingly picked up sulphur from the gas and from the metal. Such conditions tend to give higher sulphur heats. The concentration of sulphur in the metal is directly controlled by the concentration of sulphur in the slag. The ratio

per cent sulphur in metal per cent sulphur in slag

is a function of temperature, slag basicity, and of iron oxide. Since the sulphur in the slag is controlled by the sulphur in the gas, it is evident that the sulphur in the metal is ultimately influenced by the sulphur in the fuel.

Average results of the 23 heats reported in Table IX show that the pounds of sulphur in the bath and slag increased between melt-down and tap. At melt-down the system averaged 130.26 lb. and at tap 137.74 lb. of sulphur. The average gain in sulphur was 7.48 lb. Individual heats, however, gained over 37 lb. of sulphur. Such large increases in sulphur are

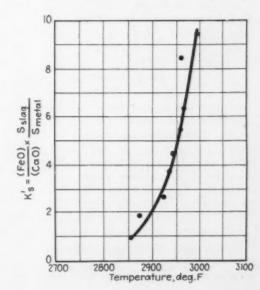


FIG. 19—Effect of slag volume on sulphur distribution and on per cent of sulphur in bath.

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FIG. 20 — Relationship between temperature and sulphur equilibrium constant.



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responsible for high sulphur heats that are unaccounted for by either hot metal scrap analysis or slag conditions. Such heats usually result in a loss of time and tonnage.

Economical production of steel depends upon the time required for the refinement of the charge of steel scrap and pig iron. As has been pointed out, desulphurization is more rapid with a slag that is not saturated or approaching saturation with calcium sulphide. To prevent saturation and to meet specifications with a known sulphur input from the charge and given fuel pick-up, a minimum volume of slag must be maintained. The effect of larger slag volumes would be to reduce the concentration of sulphur in the slag, and so to reduce the sulphur in the metal. This is shown graphically in Fig. 19. The ratio of pounds of sulphur in the metal to the pounds of sulphur in the slag is lower for the larger slag volumes, showing favorable desulphurization of the bath. This fact is borne out also by the graph showing the relationship between slag volume, in pounds, and the per cent of sulphur in the bath at tap. Large slag volumes result in low sulphur heats.

The curves drawn in Fig. 19 indicate the trend of the heats studied, the data being taken just before tap. Such data neglect the important consideration of slag basicity and temperature. For this reason, the points show considerable spread, but the trend is unmistakable.

The sulphur is eliminated from the metal in the basic open hearth process presumably by the reaction

$$FeS + CaO = CaS + FeO$$

According to Nernst¹¹ if a substance be dissolved in two immiscible or slightly miscible liquids, it possesses a constant distribution coefficient at a given temperature, when it has the same molecular weight in both solvents. According to the laws of mass action, at equilibrium

$$K_{5} = \frac{(CaS) \times (FeO)}{(FeS) \times (CaO)}$$

This expresses the fact that at equilibrium the reaction between FeS + CaO is just balanced by the reaction between CaS + FeO, the net result being a constant concentration of the reactants in the system under consideration. As the sulphur in the slag and metal is very low, the percentages will be very close to the molar con-

TABLE IX

Distribution of Sulphur Between Slag and Metal in the Basic Open Hearth

			L	b. of Sulph	nur in Slag	and in Me	tal	Lb. Sulphur in	Sulphur From Hot Metal,	Final Sulphur in Steel,
Heat No.	Date	Com- ponent	1	2	Test No.	4	5	Hot Metal	Per Cent	Per Cent
1	4/22	slag	10.17	16.85	28.26		54.20			
	1/ ==	metal	107.95	107.95	85.73		79.38			
		ratio	10.65	6.41	3.02		1.46			
		total S	118.12	124.80	114.09		133.58	37.37	27.98	0.027
2	4/22	slag	17.29	40.26	49.23	58.95	59.74			
		metal	126.17	122.93	97.05	84.11	74.41			
		ratio	7.30	3.05	1.97	1.60	1.25			
		total S	143.46	163.19	146.48	143.06	134.15	45.85	34.18	0.023
3	4/25	slag	13.93	24.85	42.60		55.09			
		metal	112.81	107.60	88.51		85.04			
		ratio	8.10	4.33	2.08	****	1.54	2/ 20	25.02	0.025
	- /	total S	126.74	132.45	131.11		140.13	36.32	25.92	0.025
4	5/25	slag	17.17	23.47	43.26		48.90			
		metal	92.90	94.58	81.07		77.69			
		ratio	5.41	4.03	1.87		1.59	20.12	24.20	0.022
	F /01	total S	110.07	118.05	124.33		126.59	30.63	24.20	0.023
5	5/26	slag	17.47	51.83	* * * * *	* * * * *	45.51			
		metal	79.83	75.84			65.19			
		ratio total S	4.57 97.30	1.46		* * * * *	1.43	21.44	29 40	0.025
6	5/26		17.76	127.67	49.02		110.70	31.44	28.40	0.023
0	3/20	slag metal	80.57	40.66 77.35	48.02 72.52		67.41			
		ratio	4.54	1.90	1.51		67.68			
		total S	98.33	118.01	120.54		135.09	26.86	19.90	0.021
7	5/27	slag	33.46	34.07	46.36		39.98	20.00	17.70	0.021
,	3/20	metal	108.24	95.31	90.47		79.16			
		ratio	3.24	2.80	1.95		1.98			
		total S	141.70	129.38	136.83		119.14	33.17	27.84	0.025
8	5/28	slag	22.44	29.67	38.63		77.62	33.17	27.01	0.025
	-/	metal	126.94	111.71	113.40		93.09			
		ratio	5.66	3.77	2.94		1.20			
		total S	149.38	141.38	152.03		170.71	34.55	20.23	0.028
9	5/28	slag	30.44	69.25			72.38			
		metal	119.05	125.67			90.94			
		ratio	3.91	1.82			1.26			
		total S	149.49	194.92			163.32	39.34	24.09	0.028
10	6/29	slag	25.27	52.44	66.85		66.77			
		metal	110.00	80.85	82.47		77.62			
		ratio	4.35	1.54	1.23		1.15			
		total S	135.27	133.29	149.32	* * * * *	144.39	39.05	27.05	0.024
11	6/29	slag	21.58	31.78	47.51		50.55			
		metal	120.36	120.36	97.79		93.28			
		ratio	5.58	3.79	2.06	*****	1.85			
		total S	141.94	152.14	145.30		143.83	36.10	25.10	0.031
12	6/30	slag	51.09	66.45			62.09			
		metal	86.30	84.40			66.96			
		ratio	1.69	1.27	* * * * *		1.08		00.01	
12	4 /20	total S	137.39	150.85	*****		129.05	38.14	29.56	0.023
13	6/30	slag	17.42	34.61	* * * * *		53.17			
		metal	97.68	79.08		****	80.63			
		ratio	5.61	2.29	****		1.52	20.40	20 45	0.004
14	7/1	total S	115.10	113.69	20.42		133.80	39.40	29.45	0.026
14	1/1	slag metal	24.01 103.78	32.72 103.78	39.43 94.49		61.13			
		ratio	4.32	3.17	2.40		86.74			
		total S	127.79	136.50	133.92		147.87	42.82	28.96	0.028
		ioidi 3	127.77	130.30	133.72		147.07	72.02	20.90	0.020

centration and for purposes of calculation of the equilibrium constant, the percentages will be used:

$$K'_s = \frac{(\text{Per cent S in slag}) \times (\text{FeO})}{(\text{Per cent S in metal}) \times (\text{CaO})}$$

The mol fractions of FeO and CaO were calculated by the procedure similar to that described by C. H. Herty, Jr. At the slag metal interface where the desulphurization reaction takes

place, the Fe₃O₅ in the slag is presumed to react with the bath as follows:

$$Fe + Fe2O3 = 3FeO$$

The FeO in the slag was calculated on this basis, also. The silica is presumed to be combined as CaO.SiO₈, and the P₂O₈ as combined to form 3CaO.P₂O₆. It is admitted that these compounds may not exist as such at

¹¹ Nernst: Zeit Phys. Chem., (1891) 8, 110. ¹² C. H. Herty, Jr.: "Chemical Equilibrium of Manganese, Carbon, Phosphorus in the Basic Open Hearth Process," A.I.M.E. Trans., 1926, 73, pp. 1107-1131.

TABLE IX—Continued

			L	b. of Sulph	ur in Slag :	and in Me	tal	Lb. Sulphur in	Sulphur From Hot Metal.	Final Sulphur in Steel,
Heat No.	Date	Com- ponent	1	2	Test No.	4	5	Hot Metal	Per Cent	Per Cent
15	7/1	slag	26.39	51.85	58.25	49.12	59.61			
		metal	106.82	102.24	90.03	88.51	82.40			
		ratio	4.05	1.97	1.55	1.80	1.38			
		total S	133.21	154.09	148.28	137.63	142.01	50.07	35.26	0.027
16	7/2	slag	26.38	40.85			53.80			
		metal	113.56	105.57			84.77			
		ratio	4.31	2.58			1.58			
		total S	139,94	146.42			138.57	41.83	30.19	0.027
17	7/2	slag	14.04	21.62			33.57			
	, -	metal	100.33	91.35			70.87			
		ratio	7.15	4.23			2.11			
		total S	114.37	112.97			104.44	39.80	38.11	0.027
18	7/3	slag	25.48	21.18	40.15		53.22			
		metal	107.93	103.43	89.94		80.95			
		ratio	4.24	4.88	2.24		1.52			
		total S	133.41	124.61	130.09		134.17	48.21	35.93	0.027
19	7/7	slag	14.13	15.18			34.68	10.21	00.70	0.02.
.,	./.	metal	111.50	102.81			86.88			
		ratio	7.89	6.77			2.51			
		total S	125.63	117.99			121.56	33.75	27.76	0.030
20	7/7	slag	16.54	51.44	40.11		54.90	33.73	27.70	0.030
	. / .	metal	109.71	102.29	97.85		88.80			
		ratio	6.63	2.00	2.44		1.62			
		total S	126.25	153.73	137.96		143.70	35.70	24.84	0.030
21	7/9	slag	48.13	59.11			64.35	33.70	24.04	0.030
	. / .	metal	91.17	82.35			82.35			
		ratio	1.89	1.39	****		1.28			
		total S	139.30	141.46			146.70	38.06	25.94	0.028
22	7/9	slag	37.83	141.40			62.13	30.00	43.74	0.020
44	1/1	metal	101.93			****	97.08			
		ratio	2.69	* * * * *		* * * * *				
		total S		****	*****	* * * * *	1.56	2405	21.20	0.007
23	7/10		139.76	27.73	21.54	****	159.21	34.05	21.39	0.027
	//10	slag metal	117.62	111.51	31.56		61.31			
					85.54	* * * * *	84.01			
		ratio total S	5.27 139.94	4.02	2.71		1.37	42.40	20.01	0.000
_	_	101013	137.74	139.24	117.10		145.32	43.68	30.06	0.028
Average		total S	130.26	137.58	134.81		137.74	39.40	27.93	

TABLE X Relationship Between Calculated Temperatures and Sulphur Equilibrium Constants

Ra	Range K's			Calculated Temp., Deg. F.	Average K's	No. of Tests
1	0 to	1.0	*************	2854	0.91	4
2	0 to	2.0		2878	1.78	9
3	0 to	3.0	**********	2924	2.55	12
4	0 to	8.0	************	2940	4.52	28
5	0 to	6.0		2960	5.53	17
6	0 to	7.0		2969	6.28	6
8	0 to	9.0		2961	8.55	1
9	0 to	10.0	*************************	2995	9.33	1

the temperature of the furnace, but certain experiments show that this mode of calculation agrees well with observed phenomenon. The free base, or available lime, is calculated by subtracting the lime combined with acids from the total. The constant K'. has been calculated from a number of heats, and grouped according to temperature as shown in Table X.

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For these experiments there was available no accurate way of determining the temperature of the bath until the heat was tapped. However, with the residual manganese determined accurately, the temperature could be calculated from the following relation determined by Herty:

$$\text{Log K}_{mn} = \left[\left(\frac{1}{T} \times 10^8 \right) - 28.95 \right] 1/4.93$$

where

 $K_{mn} = \frac{(MnO) (Available Base)^{0.80}}{(Mn) (FeO)}$

The temperatures shown in Table X were calculated using the slag and metal analysis, and the average temperatures for the given ranges of K's obtained.

The data in Table X are shown graphically in Fig. 20. The tests include preliminary as well as tapping tests from 43 heats. The increasing values for K', with temperature show why open hearth operators increase the temperature of the melt to effect desulphurization, and speak of "burning out" the sulphur. Practical experience has taught them the relationship shown in Fig. 20.

The study of open hearth data just presented again emphasizes the need for fundamental laboratory studies of the factors affecting desulphurization. Only in the laboratory can the effect of separate variables be isolated and their relative importance established.

However, laboratory studies are difficult also as slag composition must be closely controlled. Oxidizing slag conditions must be maintained, and these slags are very corrosive to crucibles, attacking either basic or acid refractories, and so changing the slag composition.

As indicated in the data just presented, the temperature must be known within very close limits. The authors' means of measuring temperatures accurately, (within 10 F. deg.) were limited, and perhaps it cannot be done under such conditions as are required in this study. Metal composition is important and should be controlled. Also, no contamination from outside sources must be allowed.

At the present time, such a study is being made at the University of Minnesota Metallurgical Laboratories. Using a rotating bath of molten steel, under a neutral gaseous atmosphere, the factors affecting desulphurization are being determined and evaluated. In this way, it is hoped, the effect of separate variables on desulphurization will be isolated.

Acknowledgment

The writers wish to express their appreciation to the officials of the Inland Steel Co. for permission to use data from their plant in this study of sulphur control in the basic open hearth. Particular credit is due to J. H. Nead, chief metallurgist, T. S. Washburn, assistant chief metallurgist, and to C. O. Geyer, chief chemist, for their assistance and cooperation.

WHAT'S NEW IN HEAT-TREATING

AN entirely new optical pyrometer operating for the first time on the potentiometer principle and reading directly in degrees rather than milliamperes has been announced by Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia. Both potentiometer and telescopes are housed in strong, lightweight alloy castings, and together weigh only two-thirds as much as the previous L & N model. Easily and rapidly operated, the instrument can be used as an industrial pyrometer or for laboratory use.

Optically, this pyrometer employs the disappearing filament method used in commercial laboratories and the Bureau of Standards for precise high temperature measurements. The calibrated source in this pyrometer is a glowing filament, the temperature of which is determined by measuring filament current by the potentiometric method. The reading of the potentiometer scale when the galvanometer needle is brought to zero is directly in temperature degrees, provided the object sighted upon is under black body conditions, that is, is completely surrounded by other objects of the same temperature, as in a furnace. Otherwise a correction must be applied.

There is a flexible eyepiece that fits the face and does not feel hot. The filament switch closes when the operator takes hold of the telescope. Focusing is done by a knurled ring, with two ranges, the lowest enabling objects only 7 in. away to be focused

3.

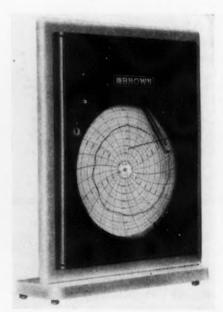
THE new L & N optical pyrometer is a new instrument operating on the potentiometer principle and calibrated to read directly in degrees for black body radiation conditions. Weight has been reduced two-thirds of previous models through the use, of light alloys for the cases of potentiometer and telescope, shown in its carrying holder.

By FRANK J. OLIVER
Associate Editor, The Iron Age

upon. Standard temperature ranges are from 1400 to 5200 deg. F.

Temperature and Pressure Recorders

ODERNLY styled and with advanced design features is an improved line of temperature and pressure recorders recently placed on the market by the Brown Instrument Co., Wayne and Roberts Avenues, Philadelphia. These instruments include thermometers of the indicating and recording types for temperatures from -40 deg. F. up to 1200 deg. F. and indicating or recording pressure and vacuum gages for ranges from 6 lb. of water up to 2500 lb. per sq. in. and vacuum ranges of 10 in. of mercury and over. The powerful, flat spiral actuating elements have ample pen torque without sacrificing speed of response. A special safety link between actuating element and pen provides an overload protection if the pen is moved in either direction manually. Chart is secured to the driving mechanism by tapered stud and tapered chart positioning stud, which is in effect the hour hand of the electric clock so that



THE case of the new Brown recording thermometers has been styled by Henry Dreyfus. Pressure and temperature recorders are offered in several ranges and in one, two and three pen models.

the charts are automatically in time. Pen arm has 434 in. of travel.

Flow Meter for Industrial Gases

LOW pressure gas meter of the ring-balance type has been developed by the Republic Flow Meters Co., 2222 Diversey Parkway, Chicago, especially for steel mill use in the measuring of the flow of coke oven and blast furnace gases, which are often very dirty. The instrument has piped connections to the high and low pressure sides of an orifice plate installed in the gas pipe and functions by measuring and recording electrically the differential in pressures. changing the calibration, it is possible to get a full scale reading on a 2-in. water differential.

The measuring element of the meter consists of a hollow welded steel ring pivoted about a horizontal axis and partitioned at the top to form a Utube, the bottom section being sealed by oil. The differential pressures are introduced to each respective chamber by flexible hose, and depending upon the amount of material flowing, the difference in pressure across the partition causes the ring to rotate until the movement is compensated by the calibrating weight. As the ring tilts, a standard Republic resistance scale suspended from the ring moves up or down in a mercury well.

This scale movement produces electrical resistance changes proportional to the gas flow that actuate standard Republic instruments — indicator, recorder and integrator—at a remote point. The gas is confined to the ring balance and does not come into contact with the measuring elements.



being put out by the Russell Electric Co., 343 W. Huron Street, Chicago, with a new black crackle finish, which is impervious to oil. Thermocouples are of 6-gage wire and the instrument has manual cold end adjustment. No electrical connections are necessary. The galvanometer scale reads directly in degrees within 2 per cent of the absolute reading.

AND PROCESS CONTROL APPARATUS

Throttling Recording-Controller

WO new types of furnace temperature recorder-controllers of the throttling type are described in catalog No. 1101E recently issued by the C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn. One is for throttling fuel heat, used in conjunction with a motor operated valve with slide wire arrangement; the other is for throttling electric heat. In the former, as the temperature rises and enters the throttling zone, the valve will close a little, thus preventing overshooting as the temperature approaches a balance between heat input and heat loss. The throttling zone can be adjusted within wide limits according to the lag characteristics of the application and maximum permissible sensitivity. For electric furnace control, in starting up, as the temperature approaches balance the percentage of "on" time is decreased in order to avoid overshooting during the heating up period.

The action of the instrument is such that the recording carriage comes to rest in a position which balances the heat input against the heat loss.

Several other new Tag instruments are also described for the first time in this catalog. One is a new Celectray indicating potentiometer controller of self-balancing type, designed to indicate temperature on a 10-in. scale. All Tag controllers utilize a beam of light, a mirror galvanometer and a phototube in place of mechanical arrangements. A special means of lighting

NTERIOR of new Republic ring-balance meter body, designed to measure flow of low pressure gas or air, particularly for the measurement of dirty gases such as blast furnace and coke oven gases encountered in steel mill service.

AMONG recording types of instruments recently announced by the makers is a new type of optical pyrometer operating on the potentiometer principle. Several models of controllers for electric and oil fired furnaces have appeared on the market, including air-fuel ratio controls. An adjustable regulator for gas-air ratios has also appeared. Much of the apparatus described is applicable to steel mill use, largely in connection with the handling and mixing of blast furnace and coke oven gases for heating operations.

the scale is accomplished by using a Lucite rod that carries the illumination from the same source of light that is used to determine the galvanometer position.

Hydraulic and Pneumatic Type Regulators

F UEL-AIR ratios for furnaces or the selected proportion of blast furnace and coke oven gases in steel mills may be maintained with two new types of Republic-Smoot regulators, fully described in data book S-13 recently issued by the Republic Flow Meters Co., 2240 Diversey Parkway.



METERS made by the Bailey Meter Co., Cleveland, for power plant and industrial processes have been restyled as to shape of case and multicolored name plate. Several mechanical improvements have also been made. The door has been reinforced and it closes upon a synthetic sponge gasket, preventing dust and moisture from entering the case. The case itself is bonderized before finishing in order to increase its durability.

Chicago. In one, the multiplying valve is actuated hydraulically, in the other, pneumatically. For both, however, the slightest change in the controlled quantity affects the measuring element and its unbalance is magnified by the multiplying valve and amplifying system into a powerful force sufficient to restore balance to the system. The stabilizing element produces a regulator speed proportional to the deviation of the controlled quantity and thus prevents the regulator from hunting.

When used for proportioning the fuel-air ratio, the measuring elements in the form of diaphragms are balanced on weighbeams which can be adjusted while the regulator is in operation. Features of the individual regulators include remote hand control for the power piston and the controlled device. The new regulators are regularly furnished mounted on welded structural steel stands with their power cylinders and accessories.

Proportioning Oil Burner

CCURATE combustion and tem-Aperature control with greater fuel economy is claimed for a proportioning oil burner developed by the Hauck Mfg. Co., 124 Tenth Street, Brooklyn. Combining a straight line flow oil control valve with a straight line flow air control mechanism in a single unit, it is said to give consistent CO, readings of 13 to 15 per cent over the full range of the burner rating. When setting the control either manually or automatically, the same lever that controls the amount of oil admitted to the burner also governs the amount of air passing through the air nozzle, so that constant combustion characteristics



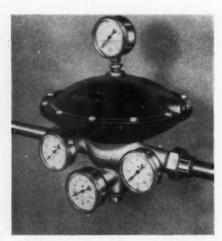
TAG recorder-controller for throttling electric heat has no measurable controller "dead zone" and will hold a steady temperature instead of the oscillating temperature of the on-off or two-position control, according to the maker, the C. J. Tagliabue Mfg. Co.



R EPUBLIC-SMOOT pneumatic type regulator with type GA measuring element in the form of two diaphragms balanced on an adjustable weightbeam. This type of regulator is for installations where gas and air pressures or flows are to be maintained in constant ratio to each other, such as in maintaining a constant fuel-air ratio.

are maintained. To obtain perfect atomization of the oil, as the primary atomizing air and oil leave the inner air nozzle of the burner in a diverging cone, the mixture is met by the secondary air leaving the burner in a converging cone, thus producing a fog of oil and air which is quickly ignited.

These burners are made in five sizes,



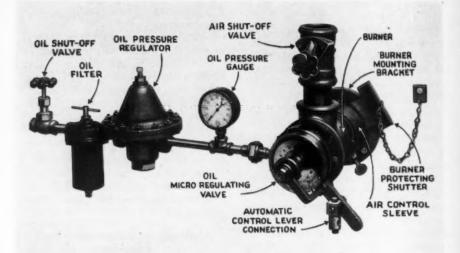
F LOW of fuel oil and its combustion air can be accurately proportioned with the new air-oil Ratiotrol developed by the North American Mfg. Co., Cleveland. It proportions the flow of fuel oil and its combustion air by controlling pressures and making them dependent upon each other. The air pressure alone becomes the dominant factor, while the number of burners and their individual settings have no effect upon the operation. In fact, the control is said to maintain a constant furnace atmosphere despite any fluctuations of air or oil pressure, varying rates of fuel input or individual adjustment of burners.

with air inlet pipes ranging from 1½ to 6 in. pipe size.

Flue Gas Analyzer

A NEWLY designed type of Orsat instrument for measuring the CO₂ content in flue gases is being marketed by the Hays Corp., Michigan City, Ind., under the trade name, Orsatomat. After the operator has aspirated a sample of gas into the unit, pushing in a rod tilts the analyzing

ing the voltage impressed on the heating resistors in accordance with temperature or pressure requirements. It is particularly suitable for continuous processes. The Reactrol system consists of a control panel, a temperature or pressure control instrument, and a saturable-core reactor. In operation, the pressure or temperature control instrument (which contains a special potentiometer) feeds low-voltage current into an amplifying tube on the



ELEMENTS of the Hauck proportioning oil burner consist of burner with mounting bracket, protecting shutter and air control sleeve, air shut-off valve, micro oil regulating valve, control lever connection and the various units shown to the left for controlling the oil pressure. This oil pressure regulator is designed so that the flow curve of the oil valve can be made parallel with the flow curve of the air mechanism.

unit causing a column of mercury to push the trapped gas sample into the absorption chamber where the CO, is instantly absorbed. The concurrent shrinkage in the sample creates a vacuum which is effective on a sensitive metallic bellows connected to a dial pointer which reads directly in per cent of CO₂. Principal design change over former instruments is the substitution of a transparent plastic for hard rubber in the tilting analyzing unit. The new unit is also housed in a streamlined, pressed steel case along with a draft measuring and indicating unit. A flue gas thermometer may also be had to fit inside the case. A two unit model is also available for measuring CO, and O2.

Electric Input Control

A NEW system for automatically regulating the power input to electrically heated equipments, such as furnaces, boilers, superheaters, and air heaters, has been announced by General Electric. Called the Reactrol system, it regulates power input by vary-

control panel. This tube, in turn, regulates the flow of direct current to the saturable-core reactor which, acting like a valve, regulates the voltage applied and thus the amount of power going to the electric heating equipment.

Repeat Cycle Timer

ATEST in the line of timers made by the R. W. Cramer Co., Inc., Centerbrook, Conn., is a repeat cycle timer especially designed for use on a.c. circuits to alternately close and open one or two circuits continuously at any preset operating interval or to close or open a single circuit after any preset operating interval and stop. The timer consists essentially of a reversible synchronous motor with inclosed gear train, an adjustable time dial and a switch unit, all inclosed in a single housing. The switch unit is a quick make and break self-locking type with silver contacts to carry a 1/2-hp. motor load or a 1200-watt heated load. A variety of time ranges are available. The timing motor is said to start on plus or minus 20 per cent of rated



RSATOMAT is the name given an automatic flue gas analyzer recently developed by the Hays Corp. The unit is smaller, lighter in weight [17½] lb.) and more compact than its predecessor. The instrument is useful in measuring the CO2 content of heat treating atmospheres as well as combustion in various types of furnaces.

voltage, and the torque provided is several times greater than that required to operate the switch mecha-

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Tool Steel Hardening Furnace

DAMAGE to tool steels by oxidation, decarburization, distortion or cracking during hardening is elim-



Power input to electrically heated equipments is controlled in the new G. E. Reactrol system by varying the voltage impressed on the heating resistors in accordance with temperature or pressure requirements.

inated through a refinement of hardening methods, utilizing a new electric furnace developed by *Westinghouse*. The success of the furnace lies in the use of a synthetic atmosphere known as Ammogas, so inactive with carbon that it does not form a soft skin on 1.5 per cent carbon steel soaked in it at 1850 deg. F. for an hour. Its strongly reducing character, on the other hand, aids in the hardening of stainless steel without tarnish.

As Ammogas is lighter than air, the furnace is tilted to an angle of 20 deg.,



THE Cramer repeat cycle timer is designed for use on a.c. circuits to uniformly reverse the flow of gases in open-hearth furnaces or to automatically control the duration of operation of electrically operated machinery or processes.

with the entrance at the low end so as to prevent air contamination. Special radiation shields hold the heat uniform. Preheating of work is unnecessary, and cooling is accomplished faster in the gas atmosphere than in air. From 1 to 3 hr. is required for heat treatment, depending upon the type of work. A bright, clean surface results. Carburizing power of Ammogas can be controlled without changing the reducing power. The gas does not change composition in the furnace.

Induction Hardening Machine

TOCCO Junior is a new low cost induction hardening machine for surface hardening small parts recently

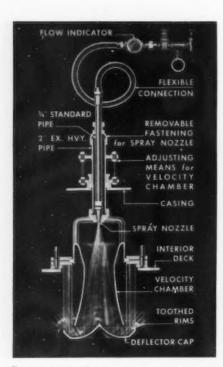


PHENOL case Duragauges in 4½ and 6 in, sizes are now available with non-breakable covers made of a transparent plastic which threads onto the gage case. Besides eliminating breakage of covers, it makes the case moisture and dust-proof and opens up the dial for easy reading. The Ashcroft American Gauge Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., is also offering a laboratory test gage of similar case construction, guaranteed to be accurate to within ½ per cent of the scale range.

placed on the market by the *Ohio* Crankshaft Co., Cleveland. The small unit is automatically controlled and incorporates all of the features of the



A N unbreakable plastic, threaded directly into the cast semi-steel gage body, is used in place of a gland packed glass tube in a new model of mercury pressure gage recently introduced by the Connelly Iron Sponge & Governor Co., 3154 S. California Avenue, Chicago. Wide angle visibility for reading on the black etched aluminum scale is provided, Scale is graduated up to 3½ lb. on one side and up to 56 oz. on the other. It is a type of gage frequently used in conjunction with flow meters.



PROCESSES of absorption, condensation, fractionation, chemical reactions, heat exchange, and gas and air washing can be facilitated in a new type of stationary disintegrator developed by the H. A. Brassert Co., Chicago. The unit combines a venturi throat and a toothed baffle plate or deflector cap at right angles to the throat.

Tocco process of surface hardening by electrically induced heat, followed by a water jet quench. It has a built-in high-frequency converter of the spark coil type for generating the high frequency eddy currents in the work. Time cycles and power input are preset. Placing of the parts in a special fixture within the inductor coil is the only manual operation. Fixtures may be readily interchanged.

The new Tocco Junior is available in four sizes of 8, 15, 22 and 30 kva. capacity. It is housed in a sturdy cabinet 78 in. long, 36 in. deep and 36 in. high.

Castable Refractory

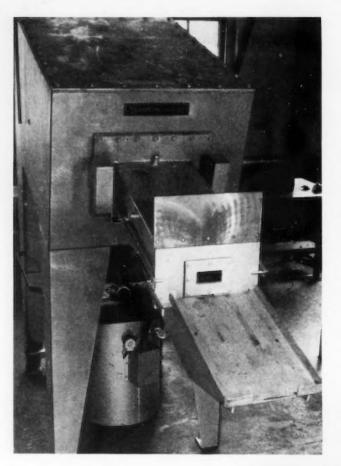
A NEW light weight, castable refractory, known as Kast-O-Lite, has been announced by the A. P. Green Fire Brick Co., Mexico, Mo. It is a mix-and-pour type of refractory that matures without the application of heat within 12 to 24 hr. Kast-O-Lite has a temperature resistance of 2500 deg. F. and may be used in direct contact with flame up to this temperature. The maker suggests it for use wherever insulating refractory properties or light weight construction are desired in such applications as combus-

tion chambers, door linings, heat shields and special insulating refractory shapes.

Stationary Disintegrator

PRIMARILY developed for gas washing in the steel industry, a new type of stationary disintegrator

the baffle plate can be adjusted from outside the tower, thereby controlling the back pressure and ultimately the velocity of the gas. It is also possible to remove and examine the high pressure liquid nozzle in each unit without shutting down the whole operation.



BELOW

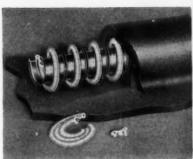
CLASHEAT electric heating elements are standard equipment on all Patterson electrically heated kettles and are also available for use in heating various types of vessels and chemical apparatus. The elements may be replaced without removal of the insulating jacket of the receptacle on which they are used. Claims for this element include: rapid heat up and greater heat concentration per unit area; rapid water cooling, if desired; high efficiency: long life and immunity from mechanical destruction. Made by the Patterson Foundry & Machine Co., East Liverpool, Ohio.

ABOVE

W ESTINGHOUSE Ammogas electric furnace especially designed for the hardening of tool steels without surface decarburization. Furnace is tilted 20 deg. at the front to prevent contamination of the lighter-than-air Ammogas.

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made by the H. A. Brassert Co., 310 S. Michigan Avenue, Chicago, has been found applicable to many other processes requiring the contacting of gaseous vapors with liquids, such as processes of absorption, condensation, fractionation in the petroleum industry, heat exchange and chemical reactions. Its fundamental construction is based on the principle of producing a concurrent flow of gas or air and of very finely divided liquid spray at high velocity through a venturi tube, with impingement on a surface at right angles to the direction of flow. The relation between the venturi tube and



The volume and pressure of the liquid may be varied by either changing the high pressure nozzle or controlling the liquid pressure.

These disintegrator units are usually used in banks. Standard rating of one unit is 1000 cu. ft. per min. of gas or vapor measured at 60 deg. F. and atmospheric pressure. Each unit acts as its own shut-off valve when adjusted to a closed position. The units may be made of any material that can be cast.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

Steel Ingots: (gross tons)	October 1939	September	August 1939	September	Nine Months 1939	Nine Months 1938
Monthly outputs	5,393,821	4.231,310	3.763,418	2.647,129	29.748.042	17,947,131
Average weekly output*	1,217,567	988.624	849.530	618.488	762,770	460,183
Per cent of capacity*	89,17	72.41	62.22	46.09	55.86	34.29
Pig Iron: (gross tons)						
Monthly outputb	3,627,590	2,878,556	2,659,813	1,680,435	20,417,008	12,249,241
Raw Materials: (gross tons)						
Coke outpute (net tons)	4,782,202	3,979,521	3.710.168	2.728.689	29,698,351	22,697,118
Lake Ore consumed ^d	5,270,707	4,184,884	3,775,132	2,313,865	28,074,239	16,731,692
Scrap iron consumed*	3,974,000	3,282,000	2,919,000	2,218,401	23,202,000	14,174,054
Castings: (net tons)						
Malleable, orderse	63.835	64.732	40.005	29.061	327.791	184,338
Steel, orderse		96,687	39.698	25,565	398,474	239,090
Finished Steel: (net tons)						
Trackwork shipments*	5,658	4,916	5,402	2.686	15,648	8,117
Fabricated shape orderst	112,097	118.020	94,314	92,469	988,575	785,354
Fabricated plate orders*	37,776	39.751	21,828	18,551	269,980	214,837
U. S. Steel Corp. shipments	1,218,545	985,030	803.822	577,666	6,858,427	4,588,224
Fabricated Products:						
Automobile productionh	323,017	192,672	103,343	89,623	2,570,161	1,642,520
Steel furniture shipments*	\$2,103,594	\$2,006,508	\$1,887,060	\$1,667,240	\$16,070,563	\$14,948,812
Steel boiler orders* (sq. ft.)	1,089,288	1,752,243	889,829	578,940	8,653,259	5,484,918
Locomotives ordered!	34	52	5	5	247	101
Freight cars ordered!	11,220	24,231	315	1,079	44,843	9,406
Machine tool index!	‡	‡	‡	117.4	‡	109.3†
Foundry equipment index*	220.4	184.4	131.4	78.7	143.3†	79.11
Non-Ferrous Metals: (net tons, U. S.	only)					
Lead shipments1	66,000	59,554	45,025	39.026	379,433 .	299,986
Lead stocks1	191,453	97,702	117,985	131,353		******
Zinc shipments ^m	73,327	69.424	49,928	43,582	407,770	269,152
Zinc stocks ^m	72,405	95,615	122,814	130,743		
Tin deliveries ⁿ (gross tons)	6.040	5.050	6.295	4,465	46.620	38,765
Refined copper deliveries	*			67,919		412,230
Refined copper stockso		*		293,080		
Exports: (gross tons)						
Total iron and steel ^p		575,613	477,078	346,068	4,278,582	3,767,585
All rolled and finished steelp		167,674	151,134	112,915	1,234,176	1,034,440
Semi-finished steel ^p		36,319	15,587	9,947	139,888	180,734
Scrap ^p		327.724	290,346	147,203	2,741,334	2,164,857
Imports: (gross tons)						
Total iron and steel ^p		29,874	28,328	27,958	266,047	181,712
Pig iron ^p		4,176	3,204	6,922	29,423	29,184
All rolled and finished steel ^p		8,342	16,478	10,349	144,670	116,660
British Production: (gross tons)						
Pig iron ^q			*	429,800		5,386,000
Steel ingots ^q	*		*	754,700		8,023,300

†Three months' average. *Not available. ‡Temporarily discontinued pending revision.

Source of data: *American Iron and Steel Institute; *The Iron Age; *Bureau of Mines; *Lake Superior Iron Ore Association; *Bureau of the Census; *American Institute of Steel Corp.; *Preliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; *Railway Age; *National Machine Tool Builders Association; *Foundry Equipment Manufacturers Association; *American Bureau of Metal Statistics; *Memerican Zinc Institute; *New York Commodity Exchange; *Copper Institute; *Department of Commerce; *British Iron and Steel Federation; *Scrap Iron and Steel Institute.

THIS WEEK ON THE

By W. F. SHERMAN

Detroit Editor

ASSEMBLY LINE

... Union wage gains total \$5,000,000 at Chrysler, but lost \$15,000,000 during strike . . . Union wins appeal board setup in new contract . . . Production resumed in Chrysler plants, sending output toward 100,000 mark.

ETROIT-After losing an estimated \$15,000,000 in wages in a 54-day strike against the Chrysler Corp., the UAW-CIO and nine of its local unions have ratified a new contract with Chrysler Corp. and have gained wage increases amounting to \$5,000,000 or \$6,000,000 a year. Financially, the union's gains are obviously not worth the effort and losses that have been involved and the union may easily have been weakened by the prolonged strike which aroused enough feeling among members so that even Philip Murray, CIO vice-president, admitted that criticism was voiced at the ratification meetings.

The union organization partly achieved one of its important objectives when it won after two and a half years a grievance procedure more to its liking with an appeal board as a final recourse in all arguments. Contrary to widely published newspaper interpretations of the contract, there is no arbitration agreement, Chrysler said officially on Monday. It has been stated that the four-man appeal board was empowered to name an outsider as final arbitrator of any point which the appeal board could not settle. On the contrary, the appeal board, consisting of two Chrysler executives and two members of the International Union, will be the final step in the grievance procedure.

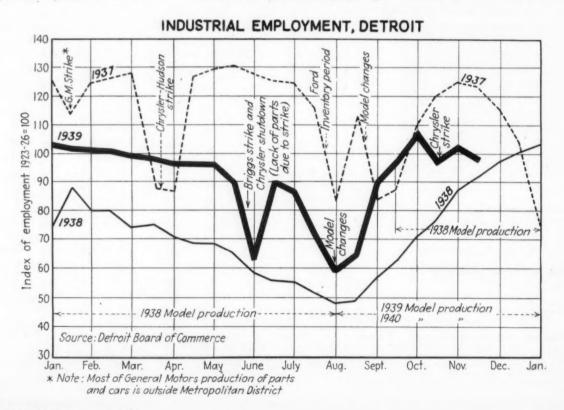
This is a radical change and is, without a doubt, one of the chief features of the new contract, as well as something entirely new in the automotive industry.

The contract provides that the ap-

peal board will consider, however, only matters which are explicitly set up in the agreement as grievances within its power and which have been properly carried through all steps of the bargaining procedure and passed through the hands of the director of labor relations of the corporation. The appeal board will not consider anything pertaining to the wage structure or matters involving corporation policy.

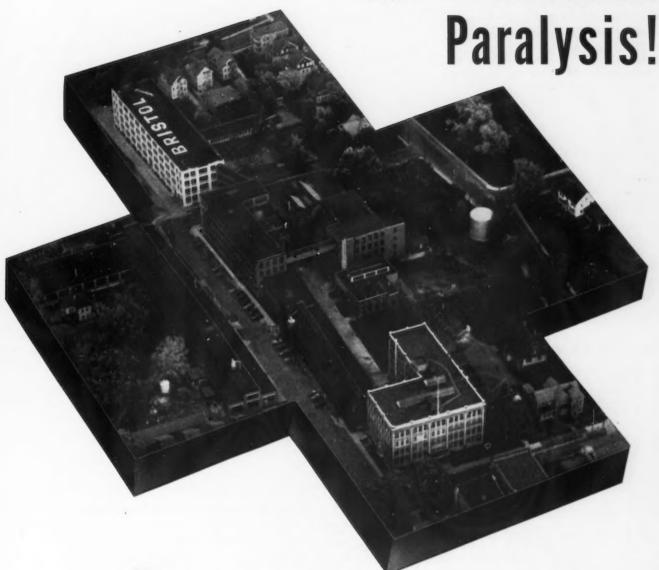
Incidentally, the strike was not officially called a strike until its closing days. The Dodge controversy, which closed that plant Oct. 6, was given the official status of a strike on Nov. 25, four days before the agreement was reached. And not until the day of the agreement did the CIO acknowledge that a production slow-down was ordered by CIO shop stewards in the Dodge plant to initiate the strike. Such acknowledgment was placed on the record at the hearing of an appeal from the Michigan Unemployment Commission's denial of benefits to idle Chrysler workmen.

The new agreement acknowledges the certification of the CIO as bargaining agent, as determined by NLRB by an election a short time ago



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for the Chrysler Jefferson, Chrysler Kercheval, Dodge Main, Dodge Forge, Dodge Truck, De Soto, Highland Park, Amplex-Harper, Plymouth, Marysville, Los Angeles and Newcastle plants with the exception of die sinkers at Newcastle.

Terms of the contract specifically exclude foremen, assistant foremen, time keepers, plant protection employees, office employees, confidential salaried employees and salaried engineers.

Careful perusal of the agreement reveals no written commitments regarding the subject of foremen's unionization. It was indicated that this issue was settled but not reduced to writing when CIO Vice-President Murray (also chairman of SWOC) agreed that the foremen's union (CIO) will not ask Chrysler for sole collective bargaining and will not organize its foremen during the lifetime of the contract.

The life of the contract expires if a strike occurs.

While the union agrees to prohibit sit-downs, stay-ins or slow-downs, it may initiate a strike and picket plants after exhausting all steps in the bargaining procedure, provided that negotiations must be kept up for at least five days and that the strike must be sanctioned by the International Union. The corporation reserves the right to discipline any employee violating this section of the agreement. The management will not cause or sanction a lockout until all bargaining procedure is exhausted, and in no case until after negotiations have continued for at least five days. The five-day feature corresponds with a Michigan requirement that five days' notice of a strike must be served on the state.

Review Board Set Up

Rates of production will be set, as heretofore, by the management, but if employees object to the speeds set on any job, the job will be re-examined with a union representative in attendance. Should a satisfactory agreement not result, the dispute shall be referred to the bargaining procedure, with the management of each plant authorized to settle such matters.

Changes were made in seniority provisions so there will be no loss of

seniority no matter how long an employee might be laid off (general practice has permitted seniority to expire after a year's layoff). The so-called "D" list which gave the right to hire men without regard to seniority up to 10 per cent of the total working force has been eliminated, although the union officially recognizes the need for exceptional employees "needed in facilitating the start of a new model or at times working forces are reduced."

Slight Wage Increases

A union statement on wages, which is the only interpretation available, declares that some workers will receive increases as high as 13c. per hr. and that on top of the general increase, many classifications will be increased by an additional 3c. per hr. (over the general 3c. raise). Differentials between outside plants and Detroit plants will be narrowed by 1c. per hr. A 5c. bonus will be paid to all workers on second and third shifts. Tool and die, engineering and maintenance workers will receive the rates paid at General Motors in its "top rate" plant, Fisher No. 23. The minimum wage for women employees becomes 68c.; for men

A day after the Chrysler settlement, and as Briggs workers returned to their jobs supplying Chrysler again, Briggs Mfg. Co. announced a blanket wage increase of 3c. per hr. for 16,049 employees. W. P. Brown, president, estimated that the increase would cost \$1,000,000 a year. He added that additional raises for skilled workers are under consideration. A Briggs union official said that the union contract with Briggs assured the union the same wage rate as that paid by Chrysler.

Production Nearing 100,000 Mark

Cars began rolling off production lines in Chrysler plants on Friday. This resumption of assemblies and the snapback from holiday-week levels sent automobile production to a new high for the year, with output reaching 93,698 cars and trucks, according to Ward's Automotive Reports. The previous week's output was only 72,520 and the level of a year ago was 97,795.

Chrysler plants, which are expected to move rapidly into high volume production, assembled 4575 units as the week came to a close. Other producers also increased their output and aimed the industry at the 100,000-mark. Ford, recouping holiday losses, increased output from 18,100 to 24,000 Fords and Mercurys. This is the highest level reached by Ford so far in the entire

(CONTINUED ON PAGE 89)

THE BULL OF THE WOODS

BY J. R. WILLIAMS





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THE IRON AGE, December 7, 1939-63

CONNECTICUT

THIS WEEK IN WASHINGTON

...TNEC, pleased by steel reaffirmation, opens general price inquiry ... Pending bills point to capital confiscation ... House inquiry into NLRB begins, with hearings opening Dec. 11 ... Jacobs administers wage-hour law.

By L. W. MOFFETT The Iron Age

ASHINGTON — Following out its White House assignment of No. 1 price watchdog, the Temporary National Economic Committee launched its general price inquiry at public hearings on Monday with the keen satisfaction that steel base prices, except on hot-rolled sheets and strips, have been reaffirmed for the first quarter, but reportedly concerned because price increases have been traced almost exclusively to causes outside the United States.

As a general thing, the committee, which was directed by President Roosevelt to maintain a "constant surveillance" on price movements, has been seeking to determine whether the responsibility for any price increases can be placed on domestic manufacturers or distributors, but it is understood that in scrutinizing prices of tin, manganese and other so-called strategic and critical war materials of which this country is building up stock piles to assure an adequate domestic supply. the committee has ascertained that price increases have resulted from the British war policy rather than from any domestic cause.

Concerned Over Labor Shortage

In this connection, although it goes beyond the committee's inquiry covering prices, some TNEC members have professed to be perturbed over a reported shortage of skilled mechanics, and this fear is understood to have been accentuated recently when the report became current in Administration circles that the British Government had purchased metal-working plants. three of which were reportedly moved to Canada from the Detroit area. Although the rumor was never substantiated by sources outside the Government, which took occasion to check on the matter, the concern expressed by committee members was that such a movement of plants would make mechanics more scarce.

The committee's general price hearings included testimony by committee members who have been making a study of prices since President Roosevelt directed the price inquiry on Sept. 29; and by other experts who presumably are well-versed in the subject of prices before and during the last war, the price situation at present, the enforcement situation with respect to prices, the inventory situation, the effect of pyramiding on prices, how prices in basic commodities affect retail prices, and related problems.

Studebaker Men Testify

Scheduled to appear before the committee on Wednesday were H. S. Vance, board chairman of the Studebaker Corp., South Bend, Ind., and Paul G. Hoffman, president of the Studebaker Corp., South Bend, Ind. Other representatives of private industry, including purchasing agents, manufacturers and distributers were called by the TNEC to relate their experiences with, and any conclusions concerning, recent price movements, and to make suggestions to the committee for proceedings with its assign-price watchdog assignment.

Speaking on behalf of the Government were Commissioner of Labor Statistics Isador Lubin, who testified on wartime prices and price trends, and Willard Thorp, special adviser to Secretary of Commerce Hopkins, whose testimony covered factors affecting prices. Assistant Attorney-General Thurman Arnold, head of the Justice Department's anti-trust division, gave the committee his interpretation of the economic function of the anti-trust laws in the current price situation, and Securities Exchange Commissioner Leon Henderson told the committee what he thought about the importance of "price balance."

The technique adopted by the committee as it continues its price investigation apparently is to single out industries where there is recognized price leadership and attempt to impress industry representatives that TNEC power may grow if price increases become widespread without justification.

ICC Orders Limited Cuts in Scrap Rates

WASHINGTON—In a decision announced last Friday, the Interstate Commerce Commission ordered reductions in rates in two instances on scrap iron in carloads to a basis of 70 per cent of the iron and steel scale, plus general increases authorized May 8, 1938. One movement relates to rates from Lynchburg, Roanoke and certain other points in Virginia to Butler and Johnstown, Pa., and Youngstown, Ohio, and from Lynchburg to Harrisburg, Pa., and Canton, Ohio. The other case relates to shipments from Lynchburg and Roanoke to Norfolk and Newport News, Va., for export. The commission held that rates on shipments from Petersburg, Va., to these ports for export were not unreasonable. A similar finding was made with respect to rates from certain points in North Carolina and South Carolina to East Radford, Va.

In a decision making general reductions in rates between the South and Official Territory the commission ordered a decrease in less-than-carload rates on cast-iron pipe fittings from 40 to 35.5 per cent of the first-class rate.

Administration Defends Its Policy on "Navicerts"

W ASHINGTON — Criticism of the administration for permitting the British Government to establish its "navicert" system governing American exports through contraband control areas to neutral European ports has been answered by the State Department with the statement that the system is operated by the British Government and American exporters, and that this Government is not officially involved. It was added, however, that the United States Government is reserving all its rights under international law. The same system was in effect during the World War.

Operated by the British Consulate in New York, the system was put into

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effect last Friday, when more than 200 applications for "navicerts" were filed. A "navicert," or naval certificate, is designed to expedite American goods through British and French contraband patrol areas, and costs \$2 on shipments of less than 1000 tons and \$8 for larger shipments. At present the system covers American shipments to Belgium, Iceland, Italy, the Netherlands,

Denmark, Finland, Estonia, Latvia, Norway and Sweden.

The system permits pre-examination by British Consulates of American exports. While a cargo if covered by navicerts, may ordinarily proceed without naval patrol examination, the British Embassy has said the navicerts do not offer an absolute guarantee of free passage.

NLRB Upholds Discharge of Bethlehem Company Seamen

7ASHINGTON—The National Labor Relations Board's crack at the CIO's National Maritime Union's sit-down strikes on vessels of the Calmar Steamship Corp., Bethlehem Steel Co. subsidiary, was widely viewed as an almost incredible reversal of the board's previous attitude of condonation of sit-downers. The board upheld the company's discharge of the strikers and dismissed their complaint against the company. By some this change in front was attributed to several causes. Among them were: (1) Reversal by the Supreme Court of the board's order directing reinstatement of 100 sit-downers in the Fansteel Metallurgical Corp. case; (2) the more conservative character of the board since William M. Leiserson succeeded Donald Wakefield Smith; (3) rising popular as well as court criticism of the sit-down strike; (4) forthcoming Congressional investigation of the board and (5) the peculiar character of a sit-down strike on a ship as distinguished from a sitdown strike in an industrial plant.

That the last named point was an element in the board's action in dismissing the NMU complaints was indicated in the board's statement that "under the peculiar circumstances of this case, we are of the opinion that its (Calmar Steamship Corp.'s) action (discharge of a crew on the vessel Calmar) was a measure to insure the operation of the ship during the strike and was not an unfair labor practice."

Smith Agrees In Part

Sticking, however, to a policy of passing upon each case revolving around the sit-down issue, the board added:

"By so holding, we do not mean to imply that under other circumstances an employer may discharge employees because he fears they will engage in a sit-down strike."

Edwin S. Smith, known as a strong

CIO member, concurred in part with Chairman Madden and Mr. Leiserson. the other members of the board. He agreed with the majority respecting four ships but dissented as to the other six vessels. Regarding four vessels, the Oakmar, Losmar, Flomar and Calmar, Mr. Smith said that the strike had been wholly dissipated and further removal of crews from docking in Baltimore could not be justified. He also held that the steamship company discriminated against the NMU by hiring only members of the Seamen's Division, AFL affiliate. Strikes on Texmar and Vermar, Mr. Smith said, were caused by unfair labor practices, and "members of the crews of these two ships would ordinarily be entitled to reinstatement." He added that the question arises whether, under the holding in the Fansteel case, "the board is remedying the unfair labor practices which brought on the strike, would have the power to order the reinstatement of members of the crew of the Texmar whose refusal to leave the ship lasted for about a day and members of the crew of the Vermar whose refusal to leave the ship lasted at most for only a few hours.

Justified in Removals

The board said the Calmar company was justified in discharging and removing NMU crews and substituting AFL crews where a general sit-down strike order was out. The case grew out of the corporation's removal in September, 1937, of a crew from the Oakmar, upon order from the district court of the United States.

In the course of its decision the board said:

"As long as the general sit-down strike order remained unrescinded, we must regard the situation as a strike situation. In the case of the *Oakmar* and the *Losmar*, sit-downs actually occurred, and the respondent resorted to the court to secure the removal of the

NMU crews from those two ships. In the case of the *Calmar*, with the general sit-down strike call still in effect and the crew of the *Losmar* still sitting down, the respondent avoided the necessity of applying to the court by preventing a sit-down. Under the particular circumstances of this case, we are of the opinion that its action in this respect was a measure to insure the operation of the ship during the strike and was not an unfair labor practice."

Standards Bureau Publishes Booklet on Steel Homes

WASHINGTON—Giving the results of tests on wall construction marketed by the Bender Body Co., under the trade name "Bender Steel Homes," the National Bureau of Standards has released a publication containing technical information based on numerous bureau tests of performance of materials for low-cost housing.

The specimens were subjected to loads simulating actual conditions, and the results are shown graphically and in tables in the publication, copies of which are available for 10c. at the Government Printing Office in Washington.

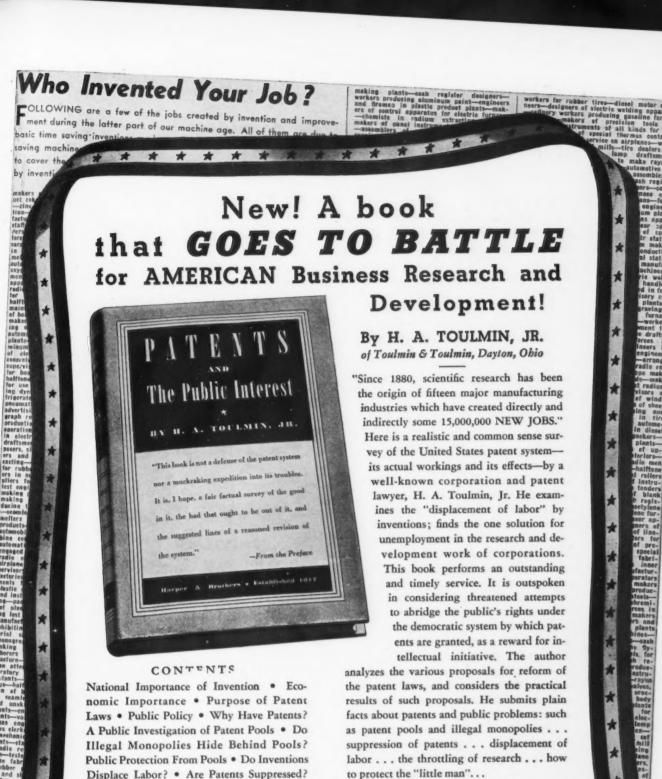
Navy Awards Orders for Metal-Working Machines

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts has awarded contracts to the following:

Tidewater Supply Co., Inc., Norfolk, Va., milling machines, \$17,309; Bryant Machinery & Engineering Co., Chicago, portable drills, \$5000; Murchey Machine & Tool Co., bolt threading machines, \$7461; Westinghouse Electric & Mfg. Co., Pittsburgh, welders, \$6320; Pioneer Instrument Division, Bendix Aviation Corp., Bendix, N. J., aircraft octants, \$227,075; Vonnegut Moulder Corp., Indianapolis, grinders, \$5392.

Treasury Awards Tin Contract

ASHINGTON—The Treasury Department's Procurement Division last week awarded a \$291,256 contract to Caswell, Strauss & Co., New York, for 280 tons of pig tin under the strategic and critical material purchasing program. The tin will come from the Dutch East Indies and Straits Settlement. A previous contract for pig tin amounted to \$534,688 and based on a price of 47.74c. per lb. The price on the latest award was 52.01c. per lb.



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Confiscation of Capital Seen As Aim of Pending Measures

ASHINGTON — President Roosevelt's trial balloon on the subject of increased taxes for national defense and his proposal to separate normal and emergency defense expenditures, classifying ordinary Army and Navy expenses under budget "A" and a \$500,000,000 item attributed to the European war under budget "B," focused attention this week on several pending Congressional bills whose scope amounts to confiscation of capital.

Already bearing the stamp of approval by the Senate Military Affairs Committee, one bill, sponsored by Senator Josh Lee, Democrat of Oklahoma, directs the President in time of war to take a census of the net wealth of the country and subjects the net wealth of each individual to the borrowing power of the Federal Government approximately on this scale: \$1,000 to \$100,000, 5 to 10 per cent; \$100,000 to \$1,000,000, 15 to 25 per cent; \$1,000,000 to \$100,000,000,75 per cent.

A Capitol Levy

Under the measure, amounts borrowed would be represented by bonds payable in 50 years and bearing interest at the rate of 1 per cent. Tax exemption would apply to neither principal nor interest. Having all the earmarks of a capital levy, the bill seeks to meet the difficulties incident to forcing everyone to sell property to provide the Government with the forced loan, by authorizing the President to accept notes or other obligations bearing 6 per cent interest and secured by liens upon specified property, and to issue currency against these notes. This plan is regarded by many observers as little more than an ingenious form of inflation.

A measure introduced by Senator Homer T. Bone, while milder than the Lee bill, would increase the income tax during war-time to the point where all incomes of individuals would be totally absorbed. In other words, the surtax would be increased so that it amounts to 50 per cent of all surtax net incomes in excess of \$6,500; 70 per cent of all such incomes in excess of \$8,000 and 93 per cent of all incomes in excess of \$20,000. Taking into consideration state income taxes, the combined taxes resulting from the proposal would amount to more than 100 per cent of income.

But while the Administration is

throwing out hints of higher taxes for national defense, it of course does not propose to go to the extent contemplated by some of these pending measures because of the fear that recovery would thereby be brought to an abrupt stop. Neither can it be said that the Administration has indorsed these measures even though they are sponsored by Administration Democrats in Congress. In fact, the New Deal presumably is aware of the fact that, while taxes should be increased during time of war and that expenses should be financed largely through taxation rather than by borrowing, there is a definite limit and the fundamental purpose of any war legislation should be to help win the war rather than to saddle the country with stringent measures whose effect would be to throw the whole economic structure out of ioint

Powers for President

In this connection, it is worthwhile to review the powers that would be conferred upon the President during time of war by another bill pending in the Senate. Identified as S. 2160, a measure to provide revenue and facilitate the regulation, and control of the economic and industrial structure of the nation, for the successful prosecution of war, and for other purposes, the bill would become effective upon the declaration of war.

In addition to "reasonably" increased income tax rates, reducing present exemption to \$800, most corporations under the measure would be taxed on their incomes at rates ranging from less than 1 to 77 per cent. depending on the ratio between undistributed net income and adjusted net income. Under a section identified as the Industrial Management Act, the President could require registration of persons engaged in managing or controlling industry. These individuals could be subjected to War Department control and could be drafted, if necessary, for service in the department and would not be entitled to compensation unless a sum was fixed and paid by the

Empowered to Fix Prices

The President would be empowered under the war resources control section to fix and establish just and reasonable maximum, minimum or absolute prices or rates or rentals for any product, foodstuff, material, real property, or right declared by him essential, for the national security and defense in the prosecution of war. Other power conferred by the bill would permit the President to close any commodity exchange or to publish rules and regulations with the force and effect of law for the government of such commodity exchanges as are not closed. He could prohibit if he so desired under the authority of the law the publication of prices in any form.

Under the war finance control section of the proposed law, a five-man War Finance Control Commission would be created, and no appointee could decline to serve, yet none would receive compensation from the Government.

Whether this actually represents the type of measure which Congress would enact in the event of war is a matter for speculation but it needs no stretch of the imagination to forecast that whatever the law, the Government would require absolute power to regulate every business, following the lines of a completely socialistic state.

NLRB Orders Back Pay for Discharged Union Members

WASHINGTON — The National Labor Relations Board has ordered the Illinois Tool Works, Chicago, to discontinue the alleged practice of discouraging membership in the AFL's International Association of Machinists and to reinstate, with any back pay due, one employee allegedly discharged for union activity.

The NLRB has certified the AFL faction of the United Automobile Workers of America at the Chrysler Corp., Evansville, Ind., plant and at the same time dismissed a petition which sought an investigation and certification filed by the CIO's automobile workers union. Board action was based on elections held Sept. 27 and 28.

Mercer Tube Claims Butt Weld Pipe Record

MERCER TUBE & MFG. CO., Sharon, Pa., on the night turn of Nov. 1, produced what the company believes to be a world's record on ½-in. pipe in a butt weld furnace. Operating strictly for eight hours, without any overtime before or after the turn, the company produced 10,087 pieces of ½-in. pipe, in 20-ft. lengths, for an average of 1260% pieces an hour.



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THE IRON AGE, December 7, 1939-69



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Government Contracts

WASHINGTON — Government contracts for iron and steel products, as reported by the Labor Department's Public Contracts Division for the week ended Nov. 25, ggreation llow:

totaled \$1,527,523. For the	
period, contracts for machinery	y aggre-
gated \$674,537; for transp	
equipment, \$7,009,507. Details	follow:
Iron and Steel Products	
Henry G. Thompson & Son Co., New Haven, Conn., Navy Purchasing	
Office, hack saw blades	\$19,321.20
William Scrimgeour, Norfolk, Va.,	
Navy Purchasing Office, steelware	62,861.12
Enterprise Foundry Co., San Fran- cisco, Navy Purchasing Office,	
steel castings	14,500.00
Colorado Fuel & Iron Corp., Den- ver, Panama Canal, steel wire	13,186.78
Sheffield Steel Corp., Kansas City, Mo., Panama Canal, reinforce-	
ment bars	17,940.00
Republic Steel Corp., Cleveland,	

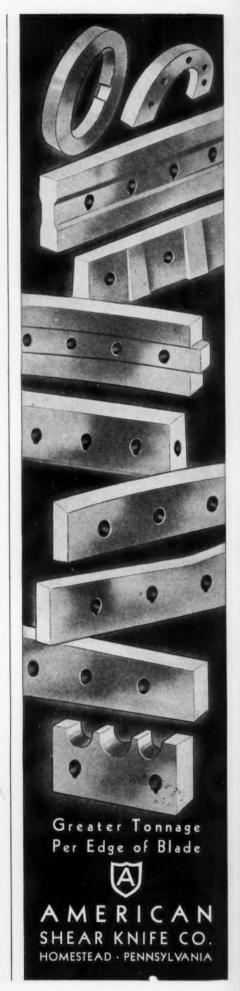
Panama Canal, reinforcement bars	57,593.75
American Safety Razor Corp.,	
Brooklyn, War CCC, safety razors	13,493.38
Bethlehem Steel Co., Bethlehem,	
Pa., War Ordnance, demolition	
bombs2,	545,095.68
Bridgeport Thermostat Co., Inc.,	
Bridgeport, Conn., War Ordnance,	
fin assemblies	22,965.81
Louisville Tin & Stove Co., Louis-	
ville, War Q M C, stoves	22.814.90
American Bridge Co., Denver, In-	
tomica mate frames	85 874 00

terior, gate frames	85,874.00
United States Steel Export Co.,	
Panama Canal, grillages	107,716.95
Bethlehem Steel Export Corp., New	
York, Panama Canal, fabricated	
steel plates	407,705.00
American Chain & Cable Co., Inc.,	
Wilkes-Barre, Pa., Panama Canal,	
wire rope	13,210.00
Crucible Steel Co. of America, Har-	
rison, N. J., War Ordnance,	
-41 4	19 040 00

steel forgings	18,040.00
The Colorado Fuel & Iron Corp., Denver, Interior, reinforcement	05 050 10
bars United States Steel Export Co.,	25,870.48
Washington, Panama Canal, re- inforcement bars	79,334.72

Machinery

troit, war Air Corps, pneumatic	
tools Pennsylvania Pump & Compressor	46,324.60
Co., Easton, Pa., War Air Corps,	
compressors	10,224.00
compressors Waterbury (Conn.) Farrel Foundry	
& Machine Co., War Ordnance,	99 600 00
charging machines	32,600.00
Keene. N. H., War Ordnance.	
Keene, N. H., War Ordnance, drilling machine	12,133.00
Stedfast & Roulston, Inc., Boston,	140 055 00
War Ordnance, boring mills Woodward Governor Co., Rockford,	142,055.00
Ill., Interior, governors	56,040.00
General Machinery Corp., Hamil-	00,010
ton, Ohio, War Ordnance, boring	
lathes	113,990.00
City, War Ordnance, honing ma-	
chine	34,536.00
E. W. Bliss Co., Brooklyn, War	
C W S, dies, tools and gages	12,845.00
Niles-Bement-Pond Co., Pratt & Whitney Division, Hartford, Conn.,	
War Ordnance, profilers	50,390.00
Brown & Sharpe Mfg. Co., Provi-	
dence, R. I., War Ordnance, milling machines	65,105,00
Cincinnati Milling Machine & Cin-	65,105.00
Cincinnati Milling Machine & Cin- cinnati Grinders, Inc., Cincinnati,	
War Ordnance, milling machines	50,129.00
Transportation Equipment	
Pressed Steel Car Co., Inc., Pitts- burgh, Pa., War Ordnance, wheel	
burgh, Pa., War Ordnance, wheel	
Goodyear Tire & Rubber Co. Inc.	\$16,344.72
Goodyear Tire & Rubber Co., Inc., Akron, War Air Corps, wheel and	
brake assemblies	98,235.90
Wright Aeronautical Corp., Pater-	000 000 00
son, N. J., War Ordnance, engines American Car & Foundry Co.,	839,675.55
New York, War Ordnance, light	
tanks	,055,251.00



NLRB Finds 60 Unions Company Dominated

WASHINGTON—After a study of the characteristics of 60 organizations identified by the board as "independent" unions and involved in litigation during the eight-month period ended Feb. 1, 1939, the National Labor Relations Board reports that in their collective bargaining experience, in their genesis and form, these unions were found to be company dominated.

The report made these additional observations:

- 1. The vast majority of the 60 unions examined were organized threeand one-half months following validation of the Wagner Act by the Supreme Court.
- 2. With but one exception they were formed at a time when an outside union was conducting an organizational compaign in the plant and in many instances their formation coincided with a strike and a back-to-work movement.
- 3. Very often company time and property were used to a substantial degree in organizing and recruiting for the "independent"; and in most cases company supervisors participated in its organization functioning.
- 4. Outside unions were frequently disparaged, and there were threats of discrimination for those who associated with the outside group.
- 5. Constitutions and by-laws were used in roughly half the total number, but often their content or manner of adoption belied self-organization on the part of the members.
- 6. Although an attempt was made to give the union a semblance of freedom in its formal aspects, it was dominated by the employer, and it continued to have the characteristics and effect of the old company union which had been outlawed.

On the theory that the major objective of the Wagner Act is to insure workers the right of self-organization as a basis for collective bargaining, the NLRB called it important in the administration of the law to establish "criteria" for measuring "employer interference and company domination." Although conceding that each case should be considered on its own merits, the board's division of economic research, which conducted the study, said it was possible to list and discuss general characteristics of labor organization which have been taken as 'evidence of company domination."



would seem to justify the purchase of a grinder. After considerable discussion a Landis 18" Universal Grinding Machine was installed which, with certain attachments, performed a great number of odd jobs from the grinding of small steel mill rolls to the internal grinding to an accuracy

of .0005 of the bore of the slitter knife pictured at the right. The performance aroused great enthusiasm as costs were cut and quality of output was bettered.

Perhaps like this manufacturer your company may not have any one job that justifies the purchase of a grinder, but this versatile Landis Universal does many unrelated jobs and in the end justifies itself.



LANDIS TOOL COMPANY WAYNESBORO, PENNSYLVANIA

INVEST IN LANDIS



Industrialists Do Not Want War Says President of Crucible Steel

X / ASHINGTON — Industrialists of the United States do not want war. Raoul E. Desvernine, president of the Crucible Steel Co. of America, told the Washington Society of Engineers at its annual banquet at the Mayflower Hotel Wednesday night, Nov. 29. Speaking on

the subject "An Industrialist Looks at war," Mr. Desvernine submitted a mass of evidence to prove that industry gained nothing in the long run from the World War. He said that the dislocation of the economic structure following it was so severe that this country was only beginning to recover



DAOUL E. DESVERNINE, president, Crucible Steel Co. of America.

when the new European war broke. Fear was expressed by Mr. Desvernine

that American participation in the present war would sound the knell of

the free enterprise system, temporarily,

if not permanently, and would so dis-

tort democracy that only its name

"I can testify from my own business

Mr. Desvernine referred to such

experience that war is even unprofit-

able in the long run to the munitions maker," said Mr. Desvernine.

typical statements as those of the Nazi

foreign office that "that group of

(American) war profiteers who want to buy profits and prosperity of other

nations" and of Soviet Foreign Com-

missar Molotov who charged that

"the American bourgeoise is interested

in intensifying the war so that its un-

crowned munitions kings can reap

statements with refutation if it were

not for the regrettable fact that so

many well-intentioned people are cajoled into believing them," said Mr.

Desvernine, "Furthermore, many votegathering politicians, self-aggrandiz-

ing demagogues and stargazing theo-

rists keep shouting these phrases until

they have almost become popular slogans and have gained considerable credence by the force of mere uncon-

"I would not dignify these absurd

would survive.

huge profits."

That Stimulate PROGRESS



Serves Your Requirements

Every fabricator of cold rolled strip steel is limited by definite production costs on each job and must deliver certain prescribed qualities in his finished products.

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being faithful to exacting requirements. Produced in a highly modernized mill with many exclusive Thomas Methods, it is processed under scientific control to meet the wide variations in manufacturers' needs.

This organization will capably supply you with the particular cold rolled strip steels that will best serve your plant and your customers.

Bright Finish Uncoated, and Electro Coated in Nickel, Zinc, Brass, Copper, Bronze, and Tin.



Wars Followed by Disturbances

tradicted repetition."

Mr. Desvernine declared that the World War was the most important

THOMAS STEEL CO.

SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL WARREN, OHIO

Dictated by these requirements, the specifications for his individual steels must be written. Then by specifying Thomastrip he can be sure that the steels will be "his steels"-match the details of his order and perform de-

Thomastrip has a wide reputation for

72-THE IRON AGE, December 7, 1939

factor affecting the economic and business history of the past 20 years, that the adverse effects of a new world war will be felt at least through the nineteen-forties, and, if of long duration, the cumulative effects of the two wars will last "beyond the turn of the century." Studies of the relation of important wars to economic cycles, he said, show that "every major war period has been followed by a generation of economic disturbances, shaken confidence, obscuration of objectives and declining values arising out of the destruction of real wealth by the war itself and the disruption of confidence in the feasibility of sane progress, enterprise and initiative.'

Statistical data show Mr. Desvernine said, that the period since the World War has witnessed a retarded trend of per capita production in the United States and a persistent downward drift of the price level.

In a summary of the immediate and ultimate consequences of war on business, Mr. Desvernine said productive peace-time economy is transformed into a destructive war-time economy; wealth is canalized and converted into destructive physical assets; men are transferred from wealth-creating machines of business to wealth-destroying engines of war; natural resources are depleted; the accent of civilization is reversed, and man dedicates himself to the art of killing instead of to the art of living.

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"It is a veritable somersault from one way of life into another," the speaker declared.

Causes Many Dislocations

He pointed out that this temporarily and artificially stimulates the agencies of business to produce hurriedly vast quantities of new and different products to meet the peculiar demands of war, most of which have no utility in peace times. New sources of supply of raw materials and manufactured articles must be found to replace normal demobilized and inaccessible sources of supply, Mr. Desvernine stated, and productive capacity is expanded rapidly to meet special and temporary needs of a basically uneconomic nature. Normal processes of trade are thrown out of balance, he added, and the increased use of credit with higher interest rates inevitably results

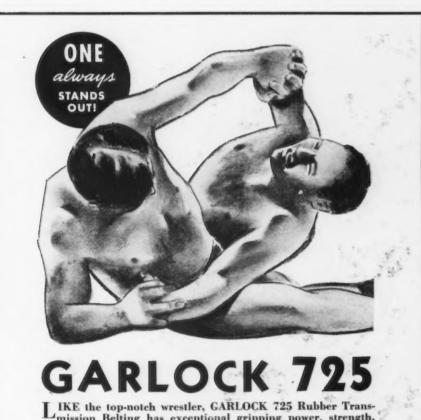
Citing other dislocations, Mr. Desvernine said commodity prices are driven up by uneconomic speculation; the increase in cost of living drives labor rates to the point where costs are distorted and profit margins

jeopardized; rigid governmental controls and higher taxes, adding to overall production costs, impair free enterprise and individual ingenuity, increase governmental debt and budgetary deficits and give rise to fear of inflation and uncertainty of the future.

Mr, Desvernine cited the record of declining prices and business failures in the post-war depression of the early twenties and said that on net balance, from a long range point of view, the war proved bad business. Mention was made of "war profits" which were reinvested in equipment which has remained unproductive for practically the entire period since the war.

War Profits a Mirage

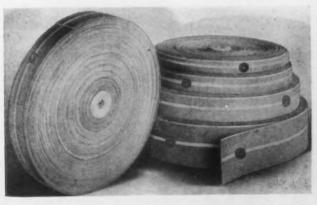
Declaring that the so-called profits of the last war proved a mirage, Mr. Desvernine enumerated the effects of the war on the economic structure in the United States, including the legacy of national debt, huge current expenditures of Federal, state and local



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governments, burdensome taxation, permanent losses of capital as a result of the post-war debt repudiation, and lagging production and world trade.

Pointing to recent trends in the United States as well as elsewhere, Mr. Desvernine warned of possible effects upon American institutions if this country becomes involved in the war.

"In the last decade we have witnessed throughout the world, and to a significant extent in our own country, unprecedented assumption by government of political and social controls," said Mr. Desvernine.

To illustrate the acceleration of governmental socialization of private industry, Mr. Desvernine pointed out that from a negligible amount in 1799 it is now found that the Government is distributing 20 per cent of the entire national income.

"If participation in another war would have the same consequences as we experienced from the last, and from which we have not as yet extricated ourselves, we will find ourselves after the war living in a new world in which democracy and the free enterprise system can find no place," said Mr. Desvernine. "Is it conceivable that any American industrialist would want to risk this possibility for the sake of problematical and illusory profits? And doesn't the record of experience indicate that this is the inevitable and logical result of our participation in war?"

As further inevitable effects of war, Mr. Desvernine asserted that security would seem to many more precious than liberty, that democracy would become an impractical ideal, that people in desperation would turn to a dictator, and that the moral fiber of citizens would be debilitated with a consequent loss of a sense of the sanctity of obligations and a destruction of the foundations of all business relations and credit. Drastic powers already possessed by the President for use in emergencies, together with broader war powers proposed, furnish a disquieting and perplexing element, Mr. Desvernine said, even while the country remains neutral.

Germany Restricts Use of Light Metals

7 ASHINGTON—Germany, according to information received at the Commerce Department, has taken steps to prohibit the consumption of light metals and their alloys for all but specifically mentioned purposes. A distinct departure from those hitherto in effect in that they do not stipulate specific uses for which the metals are forbidden, the new restrictions limit the metals for all but specific use.. Previously, the report said, there were practically no restrictions on the consumption of light metals, particularly aluminum and magnesium because of adequate supplies in Germany.

The report said that in the future light metals may be consumed, without specific permit, only for (1) products regularly manufactured by individual firms, (2) materials for military use, (3) products for export and (4) special exceptional purposes specifically approved by the trade control authorities. Government officials in this country regard the restrictions as indicative of a growing tension in supply and demand for light metals in Germany.



House Inquiry Into NLRB Gets Under Way; Hearings Start Dec. 11

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WASHINGTON — The special House committee whose job is to conduct a broad inquiry into the Wagner Act and its administration by the National Labor Relations Board is tentatively expected to begin public hearings on Dec. 11. Additional sessions are to be held outside of Washington after Congress convenes in January, and subpoenas have been issued for hearings in San Francisco. Los Angeles, Seattle and Cincinnati.

Replies to 60,000 questionnaires, which were mailed out several weeks ago, are being received by committee aides and will be analyzed for the committee's use. In the committee's initial phase of the inquiry questionnaires were mailed out to litigants on the board's docket, covering in detail all the circumstances surrounding the case, including queries as to how the trials were conducted, how the company or union was treated by the board and the effect of the board's

It is understood that numerous requests have been received for the investigating group to hold sessions in Detroit, but thus far the committee has made no announcements in this respect. Among those already subpoenaed for the Washington hearings are several board employees understood to be officers of Government employee unions, Nathan Witt, NLRB secretary; Thomas Emerson, assistant general counsel in charge of the NLRB review division; Warren Sharfman and Allen Rosenberg of the board's legal staff.

Jacobs Wage Law Director

WASHINGTON - Harold D. Jacobs, former publicity adviser to the Labor Department's wage-hour division and acting administrator since the resignation of Elmer F. Andrews, has been named by President Roosevelt as administrator until such time as Congress can remove a statutory ban preventing the nomination of Lieut.-Col. Philip B. Fleming.

Although Colonel Fleming has been designated as the top-ranking official at the wage-hour division, a statute passed in 1870 prevents him from becoming legally qualified. The fact that the agency lacked an administrator, as defined under the Fair Labor Standards Act, after Mr. Andrews' resignation, led some industry representatives to attack the legality of any steps taken

by the division prior to the appointment of an administrator.

Allegheny Ludlum Man To Deliver Lectures

PITTSBURGH-Dr. V. N. Krivobok, associate director of research, Allegheny Ludlum Steel Corp., will deliver the first in a series of lectures before western chapters of the American Society for Metals at Houston. Tex., Dec. 8. Dr. Krivobok will talk

on "Recent Developments in Heat and Corrosion Resisting Steels." The lecture will be illustrated through a motion picture film and slides.

Other cities in which the A. S. M. lectures are scheduled, include: San Francisco, Dec. 12, "The Problems of Corrosion and the Materials for the Purpose"; Los Angeles, Dec. 19, "The Evaluation of Corrosion Resisting Alloys"; Portland, Ore., Dec. 22, "Stainless and Heat Resisting Alloys"; Seattle, Wash., Dec. 23, "Stainless and Heat Resisting Alloys."



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A hot separator won't separate. The Dings pulley has twice as much surface as any similar pulley for radiating heat that destroys power. Look at the aircooled design: — corrugated radial openings, longitudinal openings, impeller hub design which forces air throughout the entire structure. No other pulley gives you this type of construction.

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foundry reports saving after in-stalling a Dings High Intensity Magnetic Separator to remove iron from the dump!

And, better castings are directly attributable to Dings Separators, too. Rejects due to blowholes, pitting and imperfections caused by iron in the sand can be eliminated by positive iron removal. Gaggers, risers, sprues, even shot iron and fine stuff can also be removed with a

Now's the time to install Dings Separators—turn out better castings at lower cost and turn your dump pile into a gold mine. Write for details. DINGS MAGNETIC SEPARATOR CO., 727 Smith St., Milwaukee, Wisc.

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INDUSTRIAL NEWS FROM CANADA

Plans Completed for Air Training Project

OTTAWA—Plans for the air training project in this country now have been completed and announcement of details will be forthcoming within a few days. It is understood that the cost of the undertaking will be around \$750,000,000. However, this sum may be spread over several years, depending largely on the urgency of the war requirements. Training fields will be established across Canada, and at present many parties sent out by the civil air branch of the transport department at Ottawa are in the different provinces seeking suitable sites for training fields. In many instances these airports will have to be extended and provided with additional equipment, while hangars and barracks for the men will have to be constructed. Already plans are well advanced in this direction and the Canadian War Supply Board is receiving tenders for construction of hangars in many parts of the Dominion. It is estimated that some 1500 training planes will be required for the pilot training project.

Since the outbreak of war, orders for 125 aircraft have been placed by the War Supply Board and Defense Department, the Public Information office here announced. These orders, valued at nearly \$15,000,000, are part of the \$45,000,000 purchases covering operations of the board from Sept. 1 to Nov. 21. The aircraft orders include 40 machines purchased in Canada and cover bombers, reconnaissance planes and trainers. It is understood the balance were ordered from United States firms. War orders over the period were as follows: Aircraft, \$15,-000,000; clothing and equipment, \$8,-000,000; foodstuffs, \$4,000,000; construction projects, \$10,000,000; fuel. \$2,500,000; machinery, \$1,500,000; vehicles, \$450,000 and miscellaneous \$5,-000,000. In addition, \$25,000,000 in orders for rolling stock for the Canadian National and Canadian Pacific railways were placed by the War Supply Board. Construction projects involve such work as coastal defenses, air stations, additions to existing facilities and changes and modifications in existing facilities that house the mobilized units.

Officials of Fairchild Aircraft, Ltd., Toronto, announce that some 1000 men are engaged at the plant which is operating at capacity. The company is concentrating on a special order for Bristol Blenheim bombers for the Canadian Government.

P. & H. Aircraft, Ltd., located at Barker Field, Toronto, has secured the exclusive rights for manufacture and selling of the Percival Proctor aircraft in Canada. This intermediate trainer is being used by the Royal Air Force in England. For the construction of this airplane, the company



plans immediate erection of a plant at Kingston, Ont.

Small, speedy motor boats, equipped for aircraft salvage and equipped for all weather conditions on the Atlantic and Pacific coasts to aid Royal Canadian Air Force planes which may be forced down at sea, will be put in operation in Canada soon. Tenders have been called for an initial order of eight of these craft to cost about \$15,000 each, and contracts will be awarded in a few days, an official of the War Supply Board anounced.

Algoma Steel to Add to Capacity in Sheets and Tin Plate

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TORONTO-Sir James Dunn, president of Algoma Steel Corp., has announced that the capacity of the sheet and tin plate mills at Sault Ste. Marie, Ont., will be doubled immediately, and orders have been placed to permit this enlargement. In an interview, Sir James Dunn stated that because British tin plate exports to Canada have been cut off by the war, Algoma Steel is faced with such an increase in orders that doubling the capacity for tin plate production has become necessary. He stated: "The tin plate and sheet mill of Algoma Steel Corp. has a capacity of 30,000 tons annually. The mill was installed at a cost of \$2,000,000 and went into production a few months ago and now is operating 24 hr. per day. The necessity for development to greater capacity was foreseen when the present plant was designed and economic expansion was intended as demand warranted. The war, however, has faced us with the necessity of doing in a few months what otherwise might have taken years to accomplish. Faced with treble the business we can possibly tackle with the present equipment, immediate expansion has become necessary.'

Algoma Steel Corp. is running practically at capacity in most departments at the Sault Ste. Marie steel works and backlogs and prospective orders indicate that there will be no reduction in operations for many months into the future. The greater part of business booked to date is for peace time operations and only a very small number of orders have been closed on war account. It is expected, however, that large orders for steel for munitions manufacture, as well as for other war essentials will be forthcoming early in the coming year.

October Steel Output Highest Since 1930

OTTAWA—In October, production of steel ingots made the highest monthly record since 1918, while production of pig iron was the highest monthly record since January, 1930. Pig iron production in October totaled 85,785 gross tons, which compares with 65,986 tons in September. Output for the month included 62,718 tons of basic iron, 21,329 tons of

foundry iron and 1711 tons of malleable iron. For the first 10 months of this year pig iron production totaled 573,740 tons against 605,502 tons for the corresponding period of 1938. During October seven blast furnaces were blowing with a production rate of 76 per cent of all Canadian blast furnace capacity. Furnaces in blast were located as follows: Dominion Steel & Coal Corp., Sydney, N. S., two; Steel Co. of Canada, Ltd., Hamilton, Ont., two; Algoma Steel Corp., Sault Ste. Marie, Ont., two;



For Annealing Strip in Coils

Strip — ferrous and non-ferrous — both coiled and in strands—is uniformly annealed in various types of continuous, semi-continuous and batch type, electric and fuel fired furnaces we have built. The above gas fired installation is one of several roller rail, conveyor type furnaces we recently installed in a prominent eastern plant, for annealing large coils of both narrow and wide strip.

These furnaces can be built for any size coils or for any production required.

Send for leaflets showing other installations.

Other E.F. installations include controlled atmosphere furnaces for bright and clean annealing various ferrous and non-ferrous products including wire, tubing, strip, sheet, stampings and other products—furnaces for copper brazing, scale-free heat treating and annealing without scale or decarburization as well as furnaces of various types for normalizing, short cycle malleableizing, nitriding, carburizing, enameling, billet heating, heating for forging and other processes.

Submit your furnace problems to E.F. Engineers.

We build furnaces for any process, product or production

The ELECTRIC of FURNACE co.

ELECTRIC & FUEL FIRED FURNACES —

SALEM, OHIO

Canadian Furnace Co., Port Colborne, Ont., one.

Production of ferroalloys in October amounted to 6357 tons down from 10,406 tons in September. October's output included five different gradesspiegeleisen, ferrosilicon, ferromanganese, high carbon ferrochrome and silico manganese.

Output of steel ingots and direct steel castings for October totaled 149,-890 tons against 124,384 tons in September. Cumulative production for the

10 months ended Oct. 31 was 1,087,583 tons, which compares with 987,261 tons for the corresponding period of 1938.

National Steel Car Co. Making Airplanes and Shells

AMILTON-Robert J. Magor, president of National Steel Car Co., stated that with the company's plant at Malton, Ont., turning out two complete airplanes per week for the Canadian Government, rapid progress is being made by the company in the erection of two additional units which are scheduled to come into operation early next year. This plant enlargement will have the effect of increasing production capacity two and a half times. The present plant represents more than double the capacity of the original unit, which was completed in 1938 at a cost of more than \$600,000, the first addition being completed last spring at a cost of \$500,000. The total investment on aircraft production account for National Steel Car Co., with the completion of the unit now under construction, will be in the neighborhood of \$2,500,000, while capital expenditure since the first of the current year will reach \$1,100,000. For the past couple of years National Steel Car has been producing shells for the British Government.

Steel Sales Tapering: Trade Awaits New Prices

ORONTO-Demand for steel in the Canadian markets has started to taper off. Sales in the past week dropped well below the high average reached after war broke out in Europe at the beginning of September. Local steel interests state that the slowing down in business largely is due to the fact that most consumers are covered to the year end and owing to delay in placing war contracts consumption of steel materials has not reached the volume earlier predicted. However, the slowing down is expected to be of short duration, and it is believed there will be a rush of orders as soon as books are opened for first quarter. Local steel interests have no definite information as to when books will open for the next quarter and state they have no idea as to what may take place with regard to prices for early 1940. The only changes that have gone into effect recently have been in hot rolled and galvanized sheets which were advanced 15c. per 100 lb. It is expected, however, that some minor revisions in other materials may become effective, especially as production costs have advanced sharply since the outbreak of war and raw materials coming from the United States are subjected to a 10 per cent exchange premium, when payment is made.

Canadian steel interests state that sheet capacity has been sold to the end of the year and orders are not yet being taken for early 1940 delivery. Sheet demand for 1940 is expected to reach a high record.

The automotive industry has been



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showing more interest in the market recently and according to plans of several Canadian companies demand for the first six months of the new year will be decidedly heavy, especially if a larger portion of production is turned to trucks and other vehicles for war needs.

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Inquiries for steel for first quarter delivery are appearing in good volume, indicating that commitments for the first three months of the year, ordinary peace-time business, will equal that booked for the current quarter. To this business is expected to be added orders in connection with war needs.

Pig iron sales are holding at a steady level. Current prices are firm and any change that may go into effect will be upward.

Canadian Mines Prepare To Increase Production

ORONTO, ONT .- With the TORONTO, ONT. tracted for all the surplus output of copper, lead and zinc in Canada for the next year, plans are under way to step up production at the various mines throughout the Dominion, and it also is reported that some mines that had been closed down for several years are to resume production on a large scale. Base metal mining operations also are slated for a sharp uplift and numerous properties that have been idle for years now are being opened up in the hope that they may reach the production stage before the extraordinary demand for base metals that has developed recently on war account disappears. It is stated that present producers will step into capacity production about the first of the year.

British War Orders Soon to Be Placed

OTTAWA—Col. J. H. M. Greenley, head of the British Supply Board, after two months in Canada with a large staff of technicians and experts, stated he was well satisfied with the industrial capacity of Canada. Substantial orders will be placed shortly by the board, operating through the Canadian War Supply Board. Col. Greenley just returned from an eight-day trip during which he inspected some Canadian industries, visited the New York offices of the British Supply Board under direction of Arthur B. Purvis of Montreal, and called at the British Embassy at Washington

Because of the great amount of de-

tail involved in gearing Canadian industry to a type of manufacture for which they were not prepared, it has taken some time to arrange for the letting of contracts, Col. Greenley stated. Fortunately the course of the war to date has not been such that there has been any great consumption of munitions and this has made it possible for careful and detailed negotiations with those manufacturing firms which are to be equipped for war work.

One of the biggest single orders which the Canadian board has been

asked to place for the British Government is for 10 steel anti-submarine boats of the "whale catcher" type used in the British Navy, the total contract valued at about \$4,000,000. Tenders for 30 of these boats have been invited from Canadaian shipbuilders, the additional 20 ships being for the Canadian Naval Service. Orders for shells of various sizes and types probably will constitute the bulk of the first British orders in Canada. It also is possible Canadian shipyards will be called upon to construct freighters and



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possibly destroyers of large ships of war. Discussions in this direction have been underway for some time, Col. Greenley stated.

Industrial Expansion

James R. Kearney Corp. of Canada, Ltd., stove manufacturer, 660 King Street, West, Toronto, has awarded general contract to Gatehouse Brothers, Ltd., 989 Bay Street, Toronto, for construction of factory and office on Vanderhood Avenue, Leaside, Ont. Estimated cost, \$50,000. Hamilton Bridge Co., Bay Street, N., Hamilton, Ont., has steel contract and Ball Brothers, 35 King Street, E., Kitchener, Ont., general contract, for plant addition at Waterloo, Ont., for Canada Barrel & Kegs, Ltd.

Deputy Minister of Mines for British Columbia, informed a committee of the provincial legislature in Victoria, B. C., that he understood British capital is prepared to finance an iron and steel industry in British Columbia. He stated his department is making exhaustive study and reports on power facilities, coal and iron deposits. "There is something afoot now in con-

nection with a steel plant. I cannot say any more about it, but British capital was willing to come here at the beginning of the war, and, I think, is still willing," he stated.

Dominion Steel & Coal Corp., Sydney, N. S., is completing plans for \$100,000 plant addition, on which work will be started without delay.

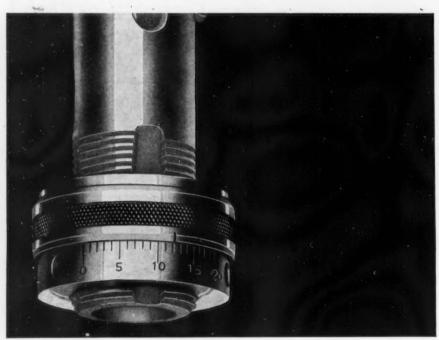
British Buying Agency Appoints Bloom, Johnson

ARTHUR B. PURVIS, directorgeneral of the British Purchasing Commission, 25 Broadway, New York, announces the appointment of Edgar S. Bloom as director of purchasers and F. Johnson as director of administration,

Mr. Bloom will retire from the presidency of the Western Electric Co. late in December, under the company's rule which provides for retirement of employees at 65. He is also a director of the Bell Telephone Laboratories, Inc., Graybar Electric Co., Inc., Northern Electric Co., Ltd., Manufacturers' Trust Co., Adams Express Co., Interborough Rapid Transit Co., National Surety Corp., 1020 Fifth Avenue Corp., Nassau Smelting & Refining Co., Manufacturers' Junction Railway, Regional Plan Association, the National Association of Manufacturers, Vertientes Camaguey Sugar Co., Electrical Research Products Inc., and Western Electric Company Ltd. of Canada.

Mr. Johnson has been vice-president of the Bell Telephone Co. of Canada since Oct. 1, 1935. He is a member of the board of directors of the Northern Electric Co., Montreal, and of the Bell Telephone Co. of Canada.

Reports have been current in Canada during the past several days that Wallace R. Campbell, chairman of the War Supply Board, is likely to resign his post soon. Mr. Campbell, it is stated, is impatient with the numerous delays that have been responsible for slowing down of contract awards and the "red tape" at Ottawa. Interviewed regarding resignation reports, Mr. Campbell stated: "I have no comment to make, I am not stating anything here at the moment," When asked if he was not satisfied with conditions, he stated "I am not commenting on that at the moment." It is understood that on several occasions recently decisions which Mr. Campbell and his board have reached, have been vetoed by the Prime Minister and his Cabinet.



GAIRING Micro-Nuts

assure precision adjustment from .001 to .020 of an inch.

Adaptable for use on either single or multiple spindles, they quickly and accurately set end-cutting tools to their correct length and, in the case of multiple spindles, in proper relation to each other.

When used in connection with any standard adapter assembly, or with tool holders and boring bars, they give you everything you have ever had before **plus** a speed and a precisioned accuracy that save time and work spoilage. They reduce the attainment of close tolerances to an automatic method of simple arithmetic.

They are graduated to permit adjustments ranging from ,001 to .020 of an inch. This is accomplished by an adjustable sleeve feature of the nut that works independent of the screw thread. The relative position of the cutting tool proper can be extended or retracted and measured adjustments controlled without guesswork or interfering with the entire tool set up.

Gairing Adjustable Micro-Nuts are available for all sizes of standard adjustable adapters. Special sizes will be furnished where needed. Write for prices.

The Gairing Tool Co., Detroit, Michigan

In Canada, Hi-Speed Tools Ltd., Galt, Ont.

SPECIALISTS IN FINE CUTTING

Canadian Companies Still Waiting For Large War Orders from Britain

ORONTO—"What is holding back war orders?" asks *The Financial Post* of Toronto, and it answers this question in the following editorial:

"Partly because the war has not been the sort of war that most people expected it to be, partly because Canada was scandalously unprepared when war broke out, due to official unwillingness to join with Britain in cooperative plans for manufacture of war supplies, scores of Canadian industrial firms are twiddling their thumbs, waiting for munitions business that has not yet come their way.

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"For two years or more British munitions plants have been piling up huge reserves of shells and munitions against the day of blitzkrieg. These plants are still turning out a tremendous volume of cannon fodder—so much more than is being used that the urge to place further orders in Canada has at present diminished.

"For this and other reasons, early expectations of munitions business, running as high as \$50 millions a month, have failed to materialize. Not even 'educational' orders, which would permit Canadian industry to tool up its plants and get the 'feel' of shell-making, have been placed in any recognizable quantity.

"Canadian industrialists do not question the sincerity of those responsible for Britain's war effort. They have waited patiently ever since the advance guard of the British mission landed at Quebec just three months ago.

"But as the days go past and nothing happens, they feel some explanation should be made either privately or publicly to clarify the mystery of the missing munitions business,

"There is a growing feeling, also, that some action should be taken without further delay toward establishing 'shadow plants' in Canada and toward speeding up the placing of educational orders, at the very least, in this country.

"There is little hope of Canada becoming an effective ally for this type of war material in under six months. In some lines of manufacture it may be as long as two years before machinery can be acquired and production lines start to run. The minimum time for producing Bren guns, it will be remembered, was 18 months.

"Canadian industrialists would like to be given a chance of preparing their plants as potential arsenals of Empire. They feel also that some explanation is due as to why there has been little else but promises to bolster early hopes of making an important contribution to the Empire war effort." In an article dealing with the situation, The Financial Post says that "Canadian industry is not, in the near future, going to get the gigantic orders it has been permitted to envisage. Those must await a completely new phase of the war."

Mossman-Yarnelle Co., 230 Pearl Street, Fort Wayne, Ind., has been appointed by the Harnischfeger Corp., Milwaukee, as welder and electrode agents.

BAKER TRUCKS GOING STRONG AFTER 11 YEARS OF HARD SERVICE

at Chicago Pneumatic Tool Company's Franklin, Penna., Foundry



Handling green foundry cores without breakage is a tough assignment, and 11 years is a long time. Yet, here is what Chicago Pneumatic says about its fleet of Baker trucks:

"These trucks have been in service since about July 1928, under severe conditions in the Foundry, and, in our opinion they have required the minimum of repairs, such as bearings, etc., to keep them in service."

If you have a handling problem and are interested in saving time and money, let the Baker Material Handling Engineer estimate possible savings in your plant. Write today

BAKER INDUSTRIAL TRUCK DIVISION

of the BAKER-RAULANG COMPANY 2175 WEST 25th STREET • CLEVELAND, OHIO



PERSONALS

H. B. CARPENTER, manager of the Cleveland district of Republic Steel Co., Cleveland, has been appointed assistant vice-president in charge of operations. He and Earl M. Richards will assist C. M. White, vice-president in charge of operations. J. L. Hyland, who has been manager of Republic's Chicago district, has been

made manager of the Cleveland dis-

Mn. Carpenter was graduated from the University of Michigan in 1906 as a chemical engineer. For a number of years he worked operating departments of Carnegie Steel Co., Jones & Laughlin Steel Corp., Pittsburgh Crucible Steel Co., and Cambria Steel Co. In

H. B. CARPENTER (left), assistant vice HYLAND (right), manager, Cleveloni

PLAN NOW TO SAVE MONEY In Your Drilling Departments



Write for Bulletin R-21A and see the features that make this High-Speed Super-Service Radial so outstanding in convenience, speed, ease of operation and productivity. Arrange to see one of these machines in operation. It is making money for hundreds of users. To cut overhead rates and production costs this machine should be working for you now. 1916 he was made assistant to the vicepresident and later manager of the plant of Colorado Fuel & Iron Co. Twelve years later he joined Republic Steel as manager of the Youngstown district and became manager of the Cleveland district in 1935.

Mr. Hyland started in the steel industry as a chemist in 1906. Nine years later he was made chief chemist at the Illinois Steel Corp. in Gary and from 1920 to 1930 was superintendent of steel production for the company. He joined Republic Steel Corp. in 1930 as district manager of the Chicago district.

C. A. BOUGHNER has been made director of safety of the Gary sheet and tin mills of Carnegie-Illinois Steel Corp. R. A. CRITTEN takes the post of general foreman of the continuous pickler, and W. P. Jones becomes assistant superintendent of industrial relations.

Mr. Boughner's service at the sheet and tin mills began in 1935 when he was employed as a construction labor foreman. Shortly after this time, he was transferred to the continuous pickler where he served as line operator and turn foreman. In 1937 he was made general foreman of the continuous pickler, the position he held until the present time.

Mr. Critten began as a clerk at the 42 in. hot strip mill in 1933. Two years later he was made order foreman of this mill and in 1936 he was appointed foreman of the continuous pickler. He became assistant superin-

CINCINNATI BICKFORD



president in charge of operations, and J. L. district, Republic Steel Corp.

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tendent of industrial relations one year later and remained in this capacity until his present appointment.

Mr. Jones was first employed at the sheet and tin mills in 1936 as a junior industrial enginer. A year later he became industrial engineer and held this post until the present time.

J. C. KEYWORTH, formerly of the Triplex Screw Co., has joined the sales staff in the Midwest territory of Lamson & Sessions Co., Cleveland. He has had considerable experience in the bolt and nut industry, having been with the Ferry Cap & Screw Co., Cleveland Brass Mfg. Co., and for a time with Wasmer Bolt & Nut Co.

A. B. Hoefer, who joined the New York office of the Udylite Corp., Detroit, in 1929 as sales engineer, has been appointed Eastern district manager of the company, with headquarters at 30 East 42 Street, New York, succeeding W. L. Cassell, who has resigned to join MacDermid, Inc., Waterbury. Mr. Hoefer was graduated from Purdue University in 1928 and for a time was employed by the General Chromium Corp., Detroit.

L. J. George, who has been identified with the company since 1929, has been transferred from Cleveland to the New York office of the company. He is also a graduate of Purdue University.

CHARLES KYLE ARCHER, chief of Carnegie-Illinois Steel Corp.'s photo-

graphic department and president of the Pittsburgh International Salon of Photography, retired Nov. 30, on reaching 70 years.

An expert in the bromoil printing process, Mr. Archer has been accorded wide recognition for many of his photographs and has served as judge of several world-famous photographic exhibitions. He began work with Carnegie Steel in 1907. He organized the company's photographic department in 1914 and has made, by his own esti-

mate, more than 10,000 industrial pictures for Carnegie-Illinois.

F. H. Fowler has resigned as president and general manager of Foote Brothers Gear & Machine Corp., Chicago, to accept a new position as assistant to president, and chief operating executive of the American Machine & Metals, Inc., of Moline, Ill., and New York. Mr. Fowler will continue as a director of Foote Brothers, however, and as chairman of the



executive committee. W. A. BARR, vice-president in charge of manufacturing of Foote Brothers, has been elected executive vice-president and general manager of the company.

FRANK P. NORRIS, vice-president and manager of the Phoenix Iron Co., Phoenixville, Pa., will retire on Jan. 1 after 50 years of continuous service with the company. He will continue in a consulting capacity for a time. MALCOLM FARMER, formerly superintendent of the rolling mills of the Phoenix company and later executive vice-president of the Stanley Works, New Britain, Conn., has been made executive vice-president. In more recent years Mr. Farmer was director of athletics at Yale University.

RALPH M. HOFFMAN, vice-president and sales manager of Link-Belt Co., Pacific division, San Francisco, for the last eight years, has been appointed assistant to the president of the parent organization, Link-Belt Co., with headquarters at the company's general office in Chicago. Mr. Hoffman, a graduate mechanical engineer, University of Minnesota, 1911, went to the Link-Belt organization in 1923 as manager of Link-Belt Meese & Gottfried Co.'s Seattle branch. He served in this capacity until 1931, the name of the Pacific Coast subsidiary meanwhile becoming Link-Belt Co., Pacific division; and from 1931 to 1939 served as vice-president and sales manager of this subsidiary.



"You get the Order because-

"We need these gages immediately and 'Greenfield' is the only company that can deliver a substantial part of the order from stock." (The actual story behind a recent \$3,000 gage order taken by a "Greenfield" salesman.)

No manufacturer can afford to wait around for gages in today's market-too costly! "Greenfield" realizes this-and has built up its stocks and facilities to give speedy service as well as super-accuracy.

"REX FINISH" GAGES FOR LONGER LIFE

"Greenfield's" "Rex Finish" is a special surface treatment which increases the life of a gage-guaranteed not to chip or crack in use and makes for much longer life.





GREENFIELD TAP & DIE CORPORATION, GREENFIELD, MASS.



Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles & San Francisco. In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.



RALPH M. HOFFMAN, assistant to president, Link-Belt Co.

H. W. GRAHAM, director of metallurgy and research, of the Jones & Laughlin Steel Corp., Pittsburgh, and Dr. H. K. Work, manager of research and development of the company, will be among the speakers at the winter meeting of the Industrial Research Institute to be held at the Stevens Hotel in Chicago, Dec. 8 and 9.



WILLIAM POHN, Pohn Iron & Metal Co., Chicago, has been elected president of the Chicago chapter of the Institute of Scrap Iron and Steel. H. S. LEWIS, Price Iron & Steel Co., Chicago, has been made first vice-president; Frank Grossman, Grossman Bros. Co., Milwaukee, second vice-president; Frank Parker, Iron & Steel Products, Inc., Chicago, third vice-president; HENRY ROSENTHAL Briggs & Turivas Co., Blue Island, Ill., treasurer; and RALPH MICHAELS.

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Hyman-Michaels Co., Chicago, secretary.

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T. M. GIRDLER, chairman of Republic Steel Corp., will speak at a dinner meeting of the Army Ordnance Association, New York post, to be held Tuesday evening, Dec. 12, at the Roosevelt Hotel, New York.



WILLIAM R. WHITE, who retired on Nov. 30 after over half a century of service with the American Steel & Wire Co., was the honor guest at a dinner given at the Waukegan works on Nov. 25, at which he was presented with the 50-year gold service medal of the United States Steel Corp.,



RAYMOND STEVENS, vice-president of Arthur D. Little, Inc., Cambridge, Mass., has been appointed director of a nation-wide survey of research in industry to be conducted by the National Research Council, New York.



Gregory J. Comstock has been appointed associate professor of powder metallurgy at Stevens Institute of Technology. Claire C. Balke has been made assistant professor of powder metallurgy. The project is sponsored by a number of industrial concerns engaged in the production of products made by the methods of powder metallurgy. A research laboratory is now being equipped at the institute.



W. C. Noll has been appointed manager of product service for the General Electric Co. appliance and merchandise department at Pittsburgh. He has been identified with the company for 30 years.



George F. Bertrand has joined the sales staff of Sheffler-Gross Co., Philadelphia. He has had a long experience in the air conditioning field.



PAUL E. GARIN, superintendent of the trim and final assembly department of the No. 1 Plant of Fisher Body Corp. in Flint, Mich., for the past year, has been transferred to the company's Kansas City plant. He has been succeeded at Flint by Leo Woodin.

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MAYNARD D. CHURCH, president of the Moore Steam Turbine Corp., Wellsville, N. Y., which has been for some time a Worthington Pump & Machinery Corp. subsidiary, has been elected vice-president of the parent company. He will continue to be in charge of Moore operations. Mr. Church was graduated from Syracuse University in 1906.

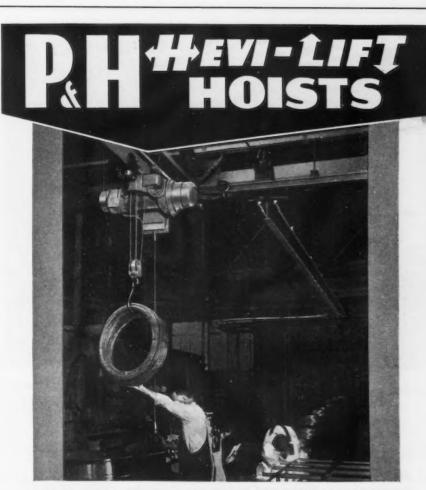
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J. R. Davis and Jerome Strauss, vice-presidents of Vanadium Corporation of America, have moved their headquarters to the general executive offices at 420 Lexington Avenue, New York. Mr. Davis, who is vice-presi-

dent in charge of operations, was formerly located at the Niagara Falls, N. Y., plant. The office of Mr. Strauss, vice-president in charge of research and development, was formerly at the Bridgeville, Pa., laboratories.



IRVIN L. CLYMER recently was elected president of the Michigan Limestone & Chemical Co., Rogers City, Mich., a United States Steel Corp. subsidiary, to succeed John G. Munson.



GET SPEED AND LOWER COST WITH "THRU-THE-AIR" HANDLING

Off the floor!... out of the aisles!... "thru the air" handling give you swift, effortless movement of loads — saves money, saves man power, saves time. P&H hoist engineers will gladly recommend the most practical material handling methods for your individual needs. Why not investigate? Or ask us to send your copy of Bulletin H-5? The Harnischfeger Corporation, 4401 W. National Ave., Milwaukee, Wisconsin.



... OBITUARY ...

CHARLES E. ATTWOOD, president of the Attwood Brass Works, died in Grand Rapids Hospital on Nov. 9, aged 55 years. He was a past-director of the Grand Rapids Metal Trades Association.

Howard C. Russ, president of the Beach-Russ and Abbe Engineering companies, New York, died of heart disease at his home in Groton, Conn., on Nov. 29, aged 67 years.

DAVID FRIEDMAN, who until his retirement 10 years ago was executive vice-president of the Page-Hersey Tubes, Inc., Toronto, and of the Cohoes Rolling Mills, Cohoes, N. Y., died at his Miami Beach home on Nov. 28, aged 74 years.

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FREDERIC C. STEVENS, vice-president of the Chilton Co., publisher of The Iron Age, died in University Hospital, Columbus, on Dec. 1, aged 61 years. He began his career in the printing

business in New York in 1903 and held executive posts in several printing companies which were later consolidated with the Chilton Co. He was managing director of the printing division of the company.

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JOHN L. OSGOOD, president and general manager of the J. L. Osgood Machinery & Tool Co., Inc., Buffalo, died on Nov. 21.

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James W. Morgan, who had been secretary-treasurer and director of the Brainard Steel Corp., Warren, Ohio, since 1929, died on Nov. 21, aged 47 years.

WILLIAM Y. BANKS, 54, manager of the steel castings sales division at the Brackenride plant of the Allegheny Ludlum Steel Corp., died Nov. 23, at his home in Aspinwall, Pa. He joined the Allegheny Steel Co., now the Allegheny Ludlum Steel Corp. in 1924 as a salesman.

CHRIS ZIMMERMAN, 70, vice-president, W. S. Tyler Co., Cleveland, before retirement three years ago, died Nov. 29, aged 70 years.

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FRANK E. HOVORKA, purchasing agent for Dingle-Clark Co., Cleveland, until his retirement six months ago, died Nov. 28, aged 64 years.

RAYMOND A. SPENCER, assistant general manager, Canadian Bridge Co., Walkerville, Ont., and of Canadian Steel Corp., died Nov. 26 at Metropolitan Hospital, Windsor. Born in Meridan, Conn., he had lived in Windsor 27 years. After graduating from Vermont University in 1908, he moved to Cobalt, Ont., where he lived for two years before moving to Windsor

KARL G. SCHAIRER, Ferndale, Mich., was fatally injured Nov. 28 when his car skidded on US-16 and struck a tree near Brighton, Mich. Born in Ann Arbor of a pioneer family, he attended the University of Michigan. He

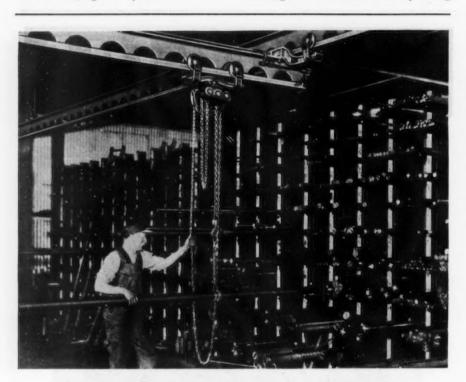
was a service representative of Acme

sor. He was a member of the Cana-

dian Institute of Engineering and the Contractors and Builders Association.

Strip Steel and Empire Sheet & Tinplate Co. He was 56 years old.

J. Frank Field, 74 years old, founder and president of the former Field Body Corp., died Nov. 29 at Owosso, Mich. Mr. Field established his business in Ionia but in 1917 he moved it to Owosso. The business was dis-



HANDLE STEEL STOCK THIS EASY WAY

The work of handling steel stock is made so easy with a simple hand-operated Cleveland Tramrail System.

Because heavy lifting and tugging is eliminated the stock man is able to handle more steel and feel fresher at the end of the day. Further, he can handle it alone, without help.

Cleveland Tramrail is lightening the work and simplifying the stock handling problem in many steel warehouses. Simple hand-operated or complete electrified systems are available.

There is a Cleveland Tramrail dealer near you ready to supply

There is a Cleveland Tramrail dealer near you ready to supply the details.



banded in 1925 when automobile companies began making their own bodies. He had engaged in manufacturing in Grand Rapids, Muskegon, Ionia and Chicago prior to founding the body company.

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GORDON C. BABCOCK, president of Babcock-Bartel Inc., an automotive parts company, was killed early in the morning of Dec. 1 when his automobile struck a tree a mile north of Mt. Clemens, Mich. Mr. Babcock was 38 years old.

* * *

George Bertram Ambler, vicepresident of the Black Diamond Saw & Machine Works, Natick, Mass., died on Nov. 29. Mr. Ambler was born in Chelsea, Mass., 66 years ago. He became associated with the Natick firm about six years ago.

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Daniel W. Klauber, president of the A. Klauber & Sons Iron & Metal Co., St. Louis, which was founded by his father in 1840, died at a hospital there. He was 82 years old.

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CLEMENT W. INGLIS, 76, former secretary-treasurer of the Milwaukee (Wis.) Steel Foundry Co., died at a local hospital Nov. 24 following a long illness. He had been a resident of Milwaukee since 1889 when he became associated with the International Harvester Co. In 1904 he helped organize the steel foundry company, continuing with the firm until 1925. From 1927 until his retirement two years ago he was associated in the engineering department of The Heil Co. Mr. Inglis was a member of the American Foundrymen's association, charter member of American Society for Metals.

. . .

REINHARD KOEPSELL, 61, vice-president of the North End Foundry Co., West Allis, Wis., died at a Milwaukee, Wis., hospital Nov. 25 following an extended illness. He was born in Germany, going to Milwaukee in 1893, aiding in organization of the foundry in 1906, and continuing active in it until his death.

. . .

INGWALD MOE, pioneer resident, civic leader and contractor, of Gary, Ind., died in that city last week, aged 68 years. Mr. Moe went to Gary from Chicago just three months after the first stakes were driven on the early townsite in 1906, and played an important part in the building of the steel mills and the community itself. In addition to many commercial building

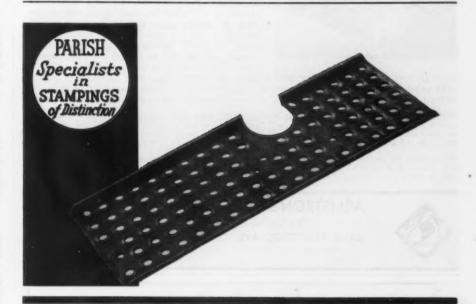
projects, Mr. Moe worked on various construction jobs at the South Chicago works of Carnegie-Illinois Steel Corp., then the Illinois Steel Co., the Gary plant of American Bridge Co., and the Indiana Harbor plant of Inland Steel Co.

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JOHN ANDREWS, JR., aged 62. assistant to the vice-president, Westinghouse Electric & Mfg. Co., East Pittsburgh, died suddenly in his home on Nov. 24. Mr. Andrews entered the

employ of Westinghouse 30 years ago and prior to his appointment as assistant to the vice-president was central district manager for the company. Before his association with Westinghouse, he was employed by the Crescent Steel Co., the Ligonier Silica Brick Co., and the Ligonier Electric Light Co.

JAMES A. MORTON, 53, steam and fuel engineer at Cleveland for the American Steel & Wire Co., died Nov.



Safety for the Brakemen



Neither the gauge, size nor specifications of a stamping presents any obstacle to Parish. Skill, experience and equipment combine to make difficult stampings comparatively easy in Parish shops.

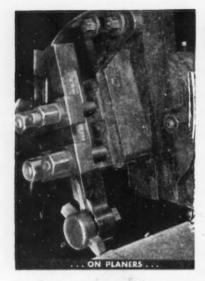
This non-skid brake step for box cars is 1/4" thick x 30" long x 10" wide. The flange is 1". Embossing around the holes makes the step non-skid. Another of the many types of stampings produced by Parish for many industries.

Have you a problem that could be worked out in pressed metal? Our engineers will do it for you.

PARISH PRESSED STEEL CO., Reading, Pa.

PACIFIC COAST REPRESENTATIVE

Somers Peterson Co., 57 California St., San Francisco. Calif.



ARMSTRONG

IMPROVE QUALITY,
INCREASE OUTPUT and
LOWER COSTS with

ARMSTRONG TOOL HOLDERS

You will do better work with the right ARMSTRONG TOOL HOLDERS on any lathe, planer or shaper, for it will give you maximum strength and rigidity, maximum clearance and visibility, will be correct in design, in cutting angle and approach, and will provide a cutting point of the finest cutting steel. You will get smoother, more accurate threads, will be able to cut-off even the largest and toughest pieces with ease, will avoid loss

through tool failures, breakage and mishap, can plane tops, both sides on a planer with same tool (illustrated)—can set the cutter in any of 10 positions or reverse the entire tool to make it a "goose-necked" tool—will produce more work at lower tool cost.

With a complement of ARMSTRONG TOOL HOLDERS (the correct Tool Holders for each operation) you can increase output at will, for each has the strength for speeds and feeds far beyond "normal" shop practices. You will save "getting ready" time too, will be permanently tooled-up and waiting machine hours will be turned into producing hours and lost time into profits.

Write today for the new ARMSTRONG C-39 Catalog. Check up on your present tool set-up. You can always pick up ARNSTRONG TOOL HOLDERS as needed from stock at your local mill supply house.



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Many standard shapes are available to fit precise needs and to reduce manufacturing costs.

OPEN HEARTH STEEL WIRE

 Bright Basic, Annealed, KONIK, Special Manufacturers, Nails, Barb Wire, Fence. 03/2/2

Are you using wine that really fits the job-in shape, temper, finish, etc?

V Why not investigate Continental Manufacturers
Wire in special analysis open hearth steel or Konik-a patented steel containing copper, nickel and chromium

CONTINENTAL

CONTINENTAL STEEL CORPORATION

24 at his home in suburban Lakewood, Ohio. He was born in Pittsburgh and received his formal education at University of Pittsburgh and Cornell University. After employment with United Engineering & Foundry Co., Pittsburgh, and service with U. S. Steel Corp. he was transferred to Cleveland from Pittsburgh in 1925.

CHARLES PASCHE, president of the Davenport-Besler Corp., Davenport, Iowa, died on Nov. 15.

ROBERT T. J. MARTIN, founder and former president of the American Shovel & Stamping Co., Lorain, Ohio, died at Elyria, Ohio, Nov. 24, after a long illness. He was 70 years old.

Philip J. Brennan, 52, purchasing agent for Austin Co., Cleveland, for 20 years, died Nov. 25 at Cleveland after a long illness. He was 52 years old.

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Cleaning Metals for Electroplating

(CONCLUDED FROM PAGE 48)

treatment ensures a metal chemically clean and retaining its lustre.

Where the work is very heavily loaded with drawing, polishing or buffing compound, the usual good practice of two-tank cleaning is recommended as an economy. A preliminary immersion in a hot 4 oz. per gal. soak solution serves to remove a major portion of the contamination, ensuring cleaner and longer operation of the electrocleaning tank. Both tanks should be provided with overflow dams for daily elimination of oil separated over night.

In cleaning brass, zinc, aluminum and their various alloys, such as die cast metals, cathodic cleaning is necessary. With these metals a cleaner concentration of 4 to 6 oz. per gal. at 160 deg. F. is recommended with a current density of about 40 amp. per sq. ft. Control of proper working concentration of electrocleaning baths is made simply by withdrawing a sample with a 10 c.c. pipette from the freshly made-up tank.

This is diluted with 100 c.c. of water and titrated with standard acid solution and phenolphthalein as end point indicator. The c.c. of titrating agent used by the fresh solution gives the standard figure at which the tank should be maintained. The difference between the c.c. obtained in subsequent control titrations and the initial standard, indicates the amount of make-up necessary.

13

SWOC Demands Dues Checkoff, Orders Crucible Strike Vote

THE Steel Workers Organizing Committee requested the checkoff of union dues, a wage increase and other concessions from Crucible Steel Co. of America with an announcement this week that it is conducting a strike vote among the company's 12,000 em-

Crucible signed a contract with the SWOC, a CIO affiliate, in 1937 and has since operated under a union agreement. Last October the SWOC petitioned the Labor Board to hold an election allowing Crucible employees to decide whether they wanted the SWOC as their sole bargaining

REINFORCING STEEL

... Awards of 3720 tons; 16,080 tons in new projects.

CANAL ZONE AWARDS

1450 Tons, Panama Canal schedule 3709; 1125 tons to Republic Steel Co., Cleveland; 300 tons to Sheffield Steel Co., Kansas City, and 25 tons to Bethlehem Steel Co., Bethlehem, Pa.

CENTRAL STATES

200 Tons, Dresser, Ind., Public Service power plant, to Bethlehem Steel Co., Bethlehem, Pa., through Foundation Co., contractor. 135 Tons, Washington County, Ohio, state project, No. 248, to Ben Tom Supply Co., Columbus, through L. T. Cisler & Son and Marion Cisler.

WESTERN STATES

900 Tons, Los Angeles, Sears-Roebuck building, to Consolidated Steel Corp., Los Angeles, through Ford J. Twaits, contractor

Angeles, through Ford J. Iwaits, contractor.

350 Tons, Berkeley, Cal., high school commercial building, to Bethlehem Steel Co., San Francisco, through Engineers, Ltd., San Francisco, contractor.

310 Tons, Palo Alto, Cal., underpass, to San Jose Steel Co.; through P. J. Tyler, Oroville, Cal., contractor.

200 Tons, Omaha, L St. viaduct, to Sheffield Steel Co., Kansas City, through Paxton-Vierling Steel Co.

175 Tons, San Francisco, Alcatraz Island dock, to Columbia Steel Co., San Francisco, through Healy-Tibbitts Construction Co., contractor.

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PENDING REINFORCING BAR PROJECTS ATLANTIC STATES

ATLANTIC STATES

1565 Tons, State of Pennsylvania, five highway projects, Nos. 2P2, 12P2, 13P1, SP2 and 18P2, for Pennsylvania Turnpike Commission. Bids close Dec. 13.

200 Tons, Philadelphia, shopping center and stores.

SOUTH AND CENTRAL

7500 Tons, Chicago, substructure, west half, south side water filtration plant. Bids

south side water filtration plant. Bids Dec. 11.

1109 Tons, Springfield, Ill., state bridge and paving work, bids in. Includes 320 tons of wire mesh. Reported last week as unstated tonnage.

175 Tons, Detroit, Parkside Housing, unit A.

175 Tons, Mt. Carmel, Ill., storm sewer, Laclede Steel Co., St. Louis, low bidder on general contract (previously reported).

100 Tons, Chicago, Wabash Railway subway, 79th & Kedzie Avenue.

WESTERN STATES

WESTERN STATES

2500 Tons, Pearl Harbor, T. H., two graving docks; bids Dec. 20.

1300 Tons, Friant, Cal., Bureau of Reclamation, Friant dam delivery, bids Dec. 12.

1100 Tons, San Francisco, Potrero housing project; Meyer Construction Co., San Francisco, low bidder on general contract.

230 Tons, Albany, Cal., regional agriculture laboratory buildings; bids in.

100 Tons, Los Angeles, improve Sepulveda Boulevard; bids Dec. 13.

Have You a Hot Rolling Problem?

Where careful metallurgical control and skilled work is required on ferrous and non-ferrous alloys—our services can be of real value to you.



We are expertly equipped to hot roll any metal into bars, rods and flats on a contract or toll basis.

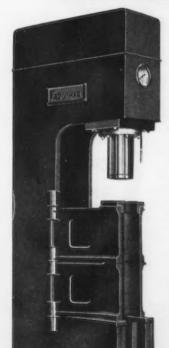
We can handle ingots or billets up to about 6" x 6" and hot roll to as small as 1/4" diameter in coils. Also a wide variety of square and flat sizes.

SEND US YOUR PROBLEM!

WILBUR B. DRIVER CO. NEWARK, NEW JERSEY

Melters and Manufacturers of "TOPHET" Resistance Wires—Nickel Chrome Alloys—Copper Nickel Alloys—Pure Nickel and Monel Wire and Strip—Stainless Steel Rods and Wire.

FARQUH



Built this press for Dravo Engineering Co.

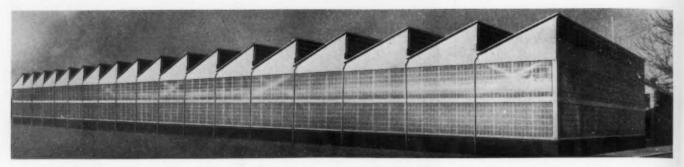
This 35-ton hydraulic arbor press is suitable for assembly, broaching, forcing, and bushing operations. Built-in hydraulic power unit is driven by a 5 H. P.

Farquhar builds hydraulic production presses for metal stamping, forming, drawing, bending, etc., requiring standard or special presses. Our engineers are ready to help you solve your press problems.

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various types.
Sent FREE on
request.



COMPLETION of this new erecting shop was the occasion of an open house celebration held by the Landis Tool Co. at Waynesboro, Pa., Dec. 2 and 3. The building provides 66,000 sq. ft. additional space, bringing the total plant floor space up to 300,000 sq. ft.

Landís Tool Co. Holds Open House

THE part that machine tools play in the daily life of people was effectively dramatized at the open house celebration held by the Landis Tool Co., Dec. 2 and 3, coincident with the completion of the company's new large erecting shop. Visitors included not only the families and friends of the company's 1300 employees, but also merchants, farmers and others of the Waynesboro, Pa., district.

Various departments of the plant were open for inspection, with Landis engineers and shop executives on hand to answer questions.

Exhibits of the old and new in automobiles, tractors, telephones, radios, household refrigerators, gas and electric ranges, sewing machines washing machines typewriters and other familiar products were impressive and revealing. In automobiles, a machine of 1910 was placed beside one of 1939,

and in tractors a Frick machine built in 1920 was contrasted with a 1939 deluxe model equipped with cab, bumpers, heater, radio, etc. Cost comparisons between the old and new were in favor of the latter, in some cases dramatically so, despite the much greater improvement in quality and in service features. These exhibits were liberally supplemented by charts, such as a list of "Industries and Jobs that Grandpa Did Not Know", and by photographic displays of primitive tools used in Colonial times, and the like

Threading equipment made by the Landis Machine Co., also of Waynesboro, and samples of threaded parts and small models of airplanes, tractors and other machines using them were also on display.

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One of the first grinders designed by A. B. Landis, who with his brother, F. F. Landis, founded the company in 1899, headed a line of six or more of the latest Landis machines, all in operation. Some of the modern methods employed by the company in designing its grinders were also demonstrated. They included a cathode ray oscillograph for studying machine vibration; a stroboscope in connection with a grinding machine spindle running at 50,000 r.p.m.; and a profilometer for studying the surface finish of ground work. Typical machine parts which are improved and the cost of which are lowered as a result of modern grinder developments were also exhibited.

Spray Painting Without Booths

The new erecting shop, the completion of which was the occasion of the open house celebration, is 125 ft. wide and 450 ft. long, and its 66,000 sq. ft. brings the total floor space of the plant up to 300,000 sq. ft. It is designed to permit finished parts to pass from the stockroom at one end by straight line either to the small-unit erecting department or to the machine erecting floor. The finished machines will



move also in a straight line to the shipping department. Five cranes, four 10-ton and one 20-ton, will serve the various section. These are of latest design, with anti-friction bearings, covered crane hook, steel catwalk and other safety features. Center crane beams support 50-ft. spans and are of the largest used in industrial shops. Two freight cars may be spotted within the building and loaded simultaneously.

Machines will be spray painted, without placing them in a booth, in a specially arranged section of the shipping department. Two large suction fans in pits beneath the floor draw the fumes and excess paint downward. The paint is separated and the fumes are carried to the top of the building on the outside. With this arrangement the workmen do not have to wear masks.

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The building is designed to furnish the maximum amount of natural light from all four sides and the roof. Some 17,000 sheets of special glass were required: this glass is ribbed both horizontally and vertically so that light coming from all directions is diffused. Soft north light is obtained through skylights.

Artificial light is furnished by 170 1000-watt lamps which will supply 42 ft.candles of light at working height over the entire building. Each light is provided with a special safety cover; these are cast under tension so that if they should break they will shatter into very small, rounded pieces.

Heating is by unit type heaters automatically controlled by thermostat. Floors are of concrete with a top coating of iron dust to keep them from dusting, but in sections where workmen are required to stand for long periods, wood block flooring is provided.

Armco Expects a Good Operation in First Quarter

"Operations in all Armco plants will continue virtually at capacity throughout the remainder of the year," Charles R. Hook, president of the American Rolling Mill Co. said last week. "From present indications we expect a satisfactory rate of operations throughout the first quarter of 1940."

On account of anticipated improved earnings for the final quarter of 1939, the board of directors of the company, at a meeting Nov. 27, again declared a dividend of \$1.25 per share on account of dividends in arrears upon the 4½% cumulative preferred

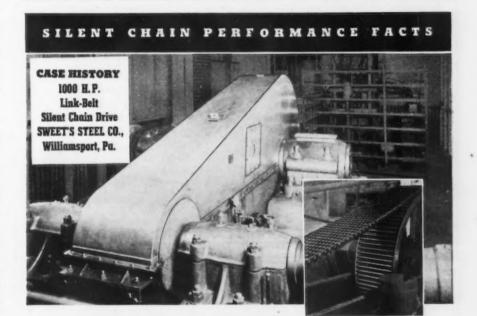
stock, payable Jan. 15, 1940, to stock-holders of record at the close of business on Dec. 15, 1939.

United Aircraft Completes Plane Engine Test House

UNITED AIRCRAFT CORP. is completing a new test house equipped to test 3600-hp. airplane engines. The unit is a part of the company's research program on which \$3,-

500,000 will have been spent this year. The Pratt & Whitney division of United Aircraft has granted a 5 per cent wage increase effective Jan. 1, and a Christmas bonus of one week's pay for its 2200 employees.

Vanadium Corp. of America announces the removal of its Pittsburgh district sales office from its Bridgeville, Pa., plant to the Henry W. Oliver Building, Pittsburgh, G. F. Fritschi is the Pittsburgh district manager of sales



Huge Drive Carries 50% to 80% Overload To Customer's Complete Satisfaction

• After this enclosed, automatically lubricated Link-Belt silent chain drive had been in service about 14 months, inspection showed that the shop coat of bluing on the sprockets was still conspicuous. Engineered for 1000 h. p., peak loads of 1500 to 1800 h. p. were carried with ease, and the customer reports complete satisfaction with the installation.

This drive replaces an engine and belt drive, and not only saves valuable space, but delivers positive, smooth and efficient transmission without variation or slippage.

Excess capacity for trouble-free service under severe conditions is built into Link-Belt silent chain drives. Their outstanding advantages cost no more, and frequently less, than flat or V-belts to install, and many records of 10, 15 and 20 years continuous service show that their cost per year is far less.

Full and interesting description of Link-Belt silent chain drives is given in Book 125, with comprehensive engineering data. Write for this, as well as books on all or any of the various Link-Belt positive drives illustrated below.

Link-Belt Company, Indianapolis, Philadelphia, Atlanta, Chicago, San Francisco, Toronto. Offices in all principal cities.









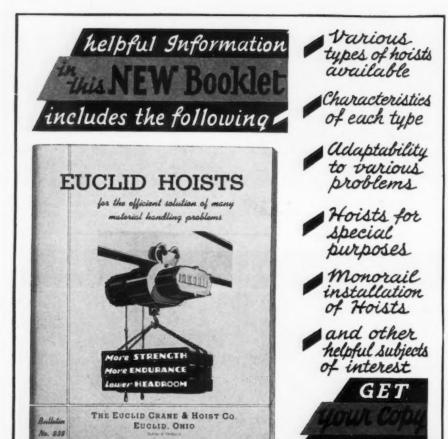


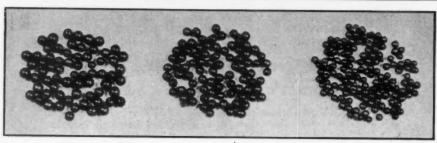




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of customers, nationally known Concerns, are using our Shot and Grit, and saving money every day, blasting faster with less wear of abrasive. Our heat treating insures to u g h n e s s and strength, fast blasting and long wearing. Try it in your machine and prove

the truthfulness of these statements.

NOW

A ton or a carload. Will match any size.

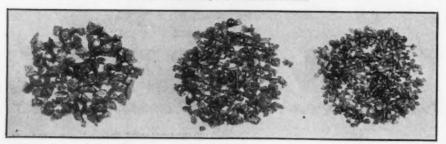
HARRISON ABRASIVE CORPORATION

We never

compromise

with quality.

MANCHESTER, NEW HAMPSHIRE



Milwaukee Metal Shops Are Working More Hours

MILWAUKEE — Metal trade shops in Milwaukee increased the average number of hours worked per week to 39.6 in October, up from 39 in the preceding month, according to a survey of 36 local plants. The number of hours worked last month was the highest since May when 41.6 hr. was recorded.

Manufacturers here were said to be watching hours closely and working extra shifts when it appears more than 40 hr. per week will be necessary. Instead of paying time and a half for all work above 40 hr., plants in the metal industry are adding a second shift.

Incomplete figures for November showed that the weekly average was holding around the 39 hr. figure.

War Plane Plant to Be Built at Boston

BOSTON—Allan H. Lockheed, co-founder of the Lockheed Aircraft Corp., of California, and Boston interests have purchased the former Mead-Harrison Mfg. Co., East Boston property, consisting of four plant units with about four acres floor space. The Mead-Morrison Mfg. Co. formerly produced heavy machinery and steam boilers. The new owners will manufacture commercial and military planes when the property has been revamped. The company, to be known as Allan H. Lockheed Aero Industries, Inc., will in no way be affiliated with the Pacific Coast company. Paul Bertelsen, of Bertelsen & Co., a Boston investment concern, is treasurer.

George F. Emery Explains Requirement for Licensing Structural Welders

ETROIT—New requirements for the licensing of structural welders employed in field work, which became effective Dec. 1, were explained at the December meeting of the American Welding Society, Detroit Section, by George F. Emery and Harry Broad of the Department of Buildings and Safety, Engineering, Bureau of Buildings, City of Detroit. The meeting was planned to familiarize architects, contractors, welders and others affected with the provisions of the new building code and the method proposed for its enforcement. The session was in the English Room, Detroit-Leland Hotel.

Metal Specialty Co. Completes New Factory

INCINNATI—The Metal Spe-Cialty Co., which recently purchased a new building and property in Richmond, Ind., has completed an addition twice the size of the original building to be used for stamping, forming, assembling, and rolling of metals, operations which were formerly carried on in Kokomo. The smaller original building will be used for the manufacture of plastic injection moldings, range of capacity being from a 11/2 oz. to 18 oz. one shot the largest being made on an 18 oz. multiple nozzle, 250 ton H.P.M. injection molding press. Incidentally, this press is among the six or seven largest of its class in the world.

Westinghouse Orders Hold Up, Robertson Reports

A W. ROBERTSON, chairman of Westinghouse Electric & Mfg. Co., reports that the business is excellent and all plants are busy, most of them working full time. Incoming orders are holding up, continuing the trend of improved business that has extended throughout most of the year. Orders booked for the first 10 months of 1939 amounted to \$176,896,557, as compared with \$125,323,348 for the same period of 1938.

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Giddings & Lewis 80 Years Old, Honors Old Employees

SPECIAL gold service pins were presented to 140 employees of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., in recognition of their service at the corporation's 80th anniversary party, Nov. 25. Presentation was made by H. B. Kraut, president, assisted by W. E. Rutz, vice-president and works manager. Pins indicating 10 or more years of service are mounted with diamonds, each diamond signifying 10 years of continuous service. Rudolph Lenz, machinist, is the oldest plant veteran.

Washington Welders Arrange Meeting

AT a joint meeting of the Washington section of the American Welding Society and the American Society for Metals, to be held Dec. 11 at the National Bureau of Standards Auditorium, A. B. Kinzel, chief metallurgist, Union Carbide & Carbon Laboratories, will discuss the "Weldability of Steels." G. E. Knox, Bureau of Yards and Docks, Navy Department, is secretary of the A. W. S. Washington section.

BLADES, BLADES, BLADES

but just ONE

There is just one MARVEL high-Speed-Edge Hack Saw Blade. It is the 100% efficiency blade that costs no more than ordinary high speed blades yet is unbreakable and will out-last and out-cut all others. Why? Because of the patented construction; a stiff tough back welded to a perfect cutting edge (for greater speeds and feeds). Use MARVEL blades to cut straighter (they'll take all the tension required for the job), to cut faster and to last longer. They simply mean more work per dollar, more work done for the dollars YOU spend for blades.



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- 2. Electrically-welded and becomes integral with:
- A cutting edge of 18%, Tungsten High Speed Steel which make MARYEL High-Speed-Edge Blades
- 4. UNBREAKABLE, IN FACT!

ARMSTRONG-BLUM MFG. CO. "The Hack Saw People" 5749 Bloomingdale Ave., Chicago, U. S. A. Eastern Sales: 199 Lalayette St., N. Y.



.. THE NEWS IN BRIEF

- Wage increases granted by Chrysler Corp. in strike settlement will total about \$5,000,000 annually. . . . New contract provides for an appeal board to review disputes. —Page 60.
- With settlement of Chrysler strike, automobile production shoots upward toward 100,000 a week mark.

 —Page 62.
- TNEC, pleased by reaffirmation of steel prices, opens hearings in general price inquiry.—Page 64.
- State Department defends Administration's stand on British "navicerts."—Page 64.
- ICC orders reductions on scrap shipments between Virginia, Ohio and Pennsylvania points.—Page 64.
- National Bureau of Standards publishes booklet on Bender steel homes.—Page 66.
- Labor Board upholds dismissal of sitdown employees on ships of Calmar Steamship Corp., a Bethlehem Steel Co. subsidiary.—Page 66.
- Navy Department awards a number of orders for metal-working machinery.—Page 66.
- Treasury awards tin contract.—Page 66.
- National Labor Relations Board orders back pay for employees allegedly discharged for union activity by the Illinos Tool Works, Chicago.
 —Page 68.
- Pending Congressional bills considered to provide for capital confiscation in war time.—Page 68.
- Mercer Tube & Mfg. Co. claims world's record in butt weld pipe production.—Page 68.
- Government iron and steel contracts in week ended Nov. 25 totaled \$1,527,523. . . . American Car & Foundry Co. receives orders for tanks costing \$6,055,251.—Page 70.
- Labor Board finds 60 independent unions "company dominated."—
 —Page 71.
- Industrialists do not want war, says
 Raoul E. Desvernine, president
 Crucible Steel Co. of America.—
 Page 72.
- Germany restricts the use of light metals and alloys.—Page 74.

- House inquiry into NLRB gets under way; hearings to begin Dec. 11.—Page 75.
- Harold D. Jacobs appointed temporary administrator of wage-hour law.

 —Page 75.
- Allegheny Ludlum Steel Corp. associate research director to deliver series of lectures.—Page 75.
- Plans completed for Canadian air training project.—Page 76.
- Canadian steel output in October highest for any month since 1930.

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- Algoma Steel Corp. to increase sheet and tin plate capacity.—Page 77.
- National Steel Car Co., Canada, completing plant expansion for aircraft and shells.—Page 78.
- Steel sales tapering in Canada; trade awaits new prices.—Page 78.
- Canadian non-ferrous mines prepare to increase production.—Page 79.
- British war orders soon to be placed in Canada, according to Col. J. H. M. Greenley, head of British Supply Board.—Page 79.
- Canadian companies still waiting for large war orders from Britain.—Page 81.
- SWOC demands dues checkoff, wage increase from Crucible Steel, takes strike vote among employees.—Page 89.

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- Westinghouse orders hold up, A. W. Robertson reports.—Page 93.

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- Metal Specialties Co., Cincinnati, completes new factory at Richmond, Ind.—Page 93.
- Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., celebrates 80th birthday by honoring 140 old employees.—Page 93.
- A. B. Kinzel, Union Carbide & Carbon, to address welding society meeting at Washington, Dec. 11.—Page 93.
- Rise in the inventories in manufacturers' hands at end of October only 3 per cent over end of September figure, says National Industrial Conference Board.—Page 96.
- Supreme Court upholds Labor Board order directing Newport News Shipbuilding to disestablish plant union.—Page 97.
- United Engineering & Foundry Co.
 obtains exclusive rights to Kinkead process for making composite metals by carbon arc welding.—Page 98.
- Bureau of Mines reports results of studies of strategic mineral supplies in U. S.—Page 99B.
- Germany gives up plan of supplying railroad equipment to the Argentine in exchange for wheat and meat.—Page 99C.
- Labor Board dismisses complaint against Decatur Iron & Steel Co.

 —Page 116.

LESS COST, LESS SPACE MORE GALLONS!

Three BIG Reasons Hundreds of Plants are Switching to Allis-Chalmers Extra-Value SSUnit Pumps!

The little pump with the big money-saving performance . . . that's what men in the field say about the sensational SSUnit Pump! And here are the three big reasons they're switching to this low-cost motor-coupled pump . . . originated by the same Allis-Chalmers engineers who designed and built the gigantic turbines at Boulder Dam and Niagara Falls.

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LESS SPACE! They set new records for compactness . . . these

husky SSUnit Pumps! And they'll operate vertically or practically any way you want them to. That means you can savevaluable space in your plant!

MORE GALLONS! You get more gallons with SSUnit Pumps because you get more efficient operation. Actual results in the field prove that new SSUnit Pumps in many cases give more than a 15% greater supply of water than older types of pumps ... and that more water means more power dollars saved!

But you don't stop there! For coupled to the SSUnit pump is the famous Allis-Chalmers Lo-Maintenance Motor... the motor that has proven performance records of beating conditions that many times wreck ordinary motors in a few weeks. There's no "buck-passing"... Allis-



PUMPING BRINE IN REFRIGerating system of a large county institution, these SSUnit Pumps take less space, cost less, give more gallons!

Chalmers accepts full responsibility for both motor and pump!

Call the nearest district office today... or write direct to Allis-Chalmers. That's the way to get started on real pump savings!

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Rise in Inventories Slow, Conference **Board Reports**

THE value of inventories in manufacturers' hands at the end of October rose only 3 per cent over the end of September figure, despite the rapid advance which occurred in business activity, according to reports on inventories, shipments, new orders and backlogs, received directly from nearly 200 representative companies by the Division of Industrial Economics of the Conference

It is pointed out, however, that in comparison with the level of manufacturing production, the value of inventories was lower at the end of October than at any time since late in 1936. They were equivalent to 2.6 months' shipments, compared with 2.8 months' shipments at the end of September. A year earlier, stocks amounted to about 31/2 months' shipments at the rate of business then prevailing.

New orders followed a downward trend during the latter half of the month, but the October total was approximately the same as that for September. The decline amounted to about one-tenth of 1 per cent, following the extraordinary steep rise in September, but orders were 71 per cent higher than in 1938. The backlog of unfilled orders advanced 18 per cent during October, reaching a point 84 per cent above that of a year ago.

The value of shipments rose 9 per cent over the September total. This was the third consecutive monthly advance, and brought shipments to a point 32 per cent higher than at the end of July.

The following table shows the changes in the various operating factors during October, in comparison with the levels of September, 1939, and of October, 1938.

		_Oct.,	1939-
	No. of Cos. Reporting	% Change from September, 1939	% Change from October, 1938
nventories	169	+ 3	- 1
hipments	163	+ 9	+32
lew orders	78	-0.1	+71
Infilled orders	89	+ 18	+84

Supreme Court Upholds Labor Board Order

W ASHINGTON—Reversing a Fourth Circuit Court of Appeals decision, the Supreme Court on Monday upheld a National Labor Relations Board order which directed the Newport News Shipbuilding & Dry Dock Co. to disestablish an alleged company dominated union. The circuit court's order had set aside parts of the board's decision and the NLRB appealed the case to the Supreme Court.

The circuit court upheld the board's order requiring discontinuance of unfair labor practices but refused to sustain that portion directing the disestablishment of the independent union. The contention of the company was that the organization was wholly free to bargain and express the wishes of employees and that the NLRB's charges that it was "the creature of the company" was unreasonable.

In its decision the lower court took into consideration evidence produced after the board completed its investigation, a step criticized by the NLRB in its appeal to the Supreme Court.

Steel Maintenance Costs Total \$171,000,000 in 1938

M ORE than \$171,000,000 was spent by the steel industry during 1938 on the upkeep of plants and properties, according to the American Iron and Steel Institute. This compares with \$260,000,000 in 1937. Maintenance expenses per ton of steel produced, however, were higher in 1938 than in the year before. Maintenance and repair charges in 1938 amounted to approximately \$8.20 per ton of finished steel produced, compared with somewhat less than \$8 per ton produced in 1937 and with approximately \$7 per ton in 1936.

Sweden May Begin Tin Plate Manufacture

W ASHINGTON—Faced with increased domestic consumption of tin plate and inadequate stocks for future demands, Sweden is weighing the possibilities of domestic production, according to information received by the Commerce Department. The report said that the principal obstacle to domestic production would be the high cost of operating a plant and added that the country would still be dependent on outside sources for its supply of tin.



Be sure and specify Clarks" on that order!
Believe me,

Clark's sure put an end



to "Kicks" out in the shop, and I'm taking no chances of that happening again.



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BOLTS

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DOMINANT SINCE 1854



if you let

DUNBAR BROS. COMPANY

design your springs and make them, too"

DIVISION OF ASSOCIATED SPRING CORPORATION

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United Engineering Acquires Kinkead Alloying Process

PITTSBURGH-UNITED ENGINEERING & FOUNDRY CO. recently acquired exclusive rights to the manufacture of machinery and equipment required in the manufacture of composite metals by carbon arc welding. This process was invented by Robert Kinkead, consulting engineer, Cleveland, and U. S. patents have recently been granted to him. A large steel company has acquired a license for the manufacture of the composite metals.

According to Mr. Kinkead the purpose of the process is to make available stainless steel surfaces on ordinary steel for the tonnage market rather than to compete with solid stainless steels.

Extensive work, over a period of many months, has been carried out in the production of low carbon steel with an alloyed surface of chromium iron or 18 per cent chromium and 8 per cent nickel stainless steel. The

material has been subjected to many fabricating processes and tests to prove the perfection of the bond between the alloyed surface and the base metal, and, according to Mr. Kinkead, it has been shown to be suitable for deep drawing.

The surface of the metal is alloyed in the steel producing plant when in the form of an ingot or slab. Ferrochrome is placed on the surface of the ingot. In case chromium nickel alloys are to be made, nickel shot is added. This is covered by a protective furnace slag. Further operation is conducted on the ingot while it is hot, and carbon arcs are used to fuse the alloy and the surface of the ingot. A correct amount of alloying element is applied to result in the desired alloy. Carbon arcs are moved progressively over the entire surface to be alloyed in such a manner as to give a uniform depth of alloy. One or both sides may be alloved.

... PIPE LINES ...

Pure Oil Co., 35 East Wacker Drive, Chicago, is considering new welded steel pipe line from Savannah, Ga., to Atlanta, Ga., close to 270 miles, for gasoline transmission, with bulk storage and distributing terminal to be located at latter place.

West Michigan Consumers Co., Muskegon, Mich., has secured permission from State Public Service Commission to construct new Sein. welded steel pipe line from Walker and Wyoming gas field districts. Kent County, Mich., to Ravenna, vicinity of Grand Rapids, Mich., approximately 21 miles, for natural gas transmission. 'Award for installation has been made to Williams Brothers Corp., National Bank of Tulsa Building, Tulsa, Okla., and work is scheduled to begin soon. Cost about \$100,000. At line terminus noted, connection will be made with main system of company and output diverted to new wet gas absorption plant to be constructed by Pent-Hex Corp., Muskegon, recently organized subsidiary, for natural gasoline production. Plant will have facilities for processing close to 10,000,000 cu. ft. per day. John L. Robinson is president of latter company.

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Southern California Gas Co., 810 South Flower Street, Los Angeles, has let contract to Macco-Robertson Co., 815 Paramount Bou'evard, Clearwater, Cal., for extensions and replacements in 16-in. welded steel pipe line in Remsen and Sheldon Avenues, Los Angeles, used for gas transmission, including lowering and reconditioning of sections of existing line.

and reconditioning of sections of existing line.

United States Engineer Office, Federal Building, Milwaukee, asks bids until Dec. 12 for quantity of wrought steel pipe. Also for wrought steel pipe fittings, steel couplings, elbows, gate valves, angle valves, etc., totaling 213 items in all (Circular 118).

213 items in all (Circular 118).

Panhandle Eastern Pipe Line Co., 101 West Eleventh Street, Kansas City, Mo., operating a pipe line system for natural gas transmission from Texas Panhandle district to points in Indiana, Illinois and Michigan, with branches in Missouri, Kansas, Oklahoma and other states, plans extensions in welded steel pipe lines in different parts of system, totaling

about 142 miles of 22- and 24-in., for construction of new loops and main lines. Also will install new compressor stations at various points for booster service, and make extensions in several such existing stations, with installation of additional equipment. Present combination gasoline-dehydration plant of company will be enlarged and new equipment installed. Fund of about \$3,500,000 has been authorized for entire project, which will be carried out in 1940. J. D. Creveling is president.

Bureau of Reclamation, Denver, Colo., has let contract to National Electric Products Corp., Fulton Building, Pittsburgh, at \$77,070 for furnishing 1,400,000 lin. ft. of 1-in. black steel pipe, and for 15,000 lin. ft. of 90- and 180-deg. bends for Central Valley project, Cal.

City Council, Duluth, Minn., plans pressure pipe lines for extensions in gas mains in parts of Halsey and Ideal Streets, and Eklund Avenue. Also will install cast iron pipe for extensions in water system in same thoroughfares.

CAST IRON PIPE

City Council, Knoxville, Iowa, has secured report from Foth & Boyds, Green Bay, Wis., consulting engineers, for main pipe lines from river wells supply source to main districts in municipality. Cost estimated about \$150,000. Proposed to carry out work soon.

Apple River, Ill., plans pipe lines for water system and other waterworks installation. Cost about \$30,000. Special election to approve project will be held soon. Cullen & Bartels, Lincoln Building, Dubuque, Iowa, are consulting engineers.

consulting engineers.

Adrian, Mich., plans pipe lines for extensions and replacements in water system and other waterworks installation. Cost about \$175,000. Special election has been called Dec. 12 to vote bonds in that amount. H. E. Smith is superintendent of water department.

is superintendent of water department.

Aubrey, Tex., will take bids soon for pipe lines for water system and other waterworks installation. Freese & Nichols, Capps Build-

ing. Fort Worth, Tex., are consulting engineers.

Cedar Hill, Tex., plans pipe lines for water system and other waterworks installation. Cost about \$32,000, of which \$15,000 will be a bond issue, recently approved. Work is scheduled to begin soon.

Hickory, N. C., plans pipe lines for water system and other waterworks installation. Bond issue of \$50,000 is being arranged for this and extensions in sewer system.

Grand Island, Neb., plans pipe lines for extensions and replacements in water system, including new 6,000,000-gal. reservoir and other waterworks installation. Cost about \$177,000. Project has been approved and work will begin soon. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

King County Water District 58, Spring Hill Community, near Renton, Wash., care of Parker & Hill, Smith Tower Building, Seattle, consulting engineers, plans early purchase of about six miles of 2- to 6-in. for water system. Financing has been arranged through Federal aid.

Willshire, Ohio, plans pipe lines for water system and other waterworks installation. Cost about \$35,000. Clifford J. Simons, 638 Hampton Avenue, Toledo, Ohio, is consulting engineer.

Water District No. 1, Town of Bethlehem, Delmar, N. Y., asks bids until Dec. 19 for pipe lines for extensions in water system, including main supply line. Also for new 30,000,000-gal. service reservoirs, pumping machinery and other waterworks installation, Solomon & Keis, 257 Broadway, Troy, N. Y., are consulting engineers.

Boston has placed 170 tons of 8-in. and 370 tons of 12-in. Class C pipe with the Warren Foundry & Pipe Corp., Boston.

Seattle has awarded 260 tons of 2, 3, 4, 6, and 8-in, pipe to United States Pipe & Foundry Co., San Francisco.

Hickam Field, T. H., utilities extensions involve 250 tons of 4, 6 and 8-in. pipe; J. E. Haddock, Ltd., Pasadena, Cal., is low bidder.

. . . GREAT BRITAIN . . .

. . . Rationing of steel is proceeding more smoothly

ONDON, Dec. 5 (By Cable)—
British steel control is working smoothly and licenses are now more easily obtainable, though consumers with large stocks are severely rationed. No pig iron is yet available for export. Negotiations are proceeding for larger imports of Continental semi-finished steel and the old Cartel agreement of maximum annual import of 525,000 tons has been abandoned.

There is increasing activity in Continental steel at home and for export. Works are well sold and are endeavoring to meet consumers' requirements. Prices are firm.

Welsh tin plate demand has been sustained, but makers need more steel and tin. Unfilled orders total over 8,000,000 base boxes. Many mills are fully sold to the middle of next year.

With less pressure of governmental demand, black sheet mills are now starting to catch up on arrears in industrial orders; hence only small bookings are available for export.

Bureau of Mines Survey Shows Ample Supply of Scrap

ASHINGTON—Domestic stocks of iron and steel scrap at consumers' and dealers' plants and in transit at the end of September, 1939, exceeded 7,220,000 gross tons, according to a preliminary report issued by the United States Bureau of Mines, Department of the Interior. Of the 7,220,000 tons accounted for, 5,405,000 tons was purchased for merchant scrap and 1,815,000 tons was home scrap held at consumers' plants.

Returns from 595 consumers that accounted for 86 per cent of the total scrap used in 1938 showed stocks of 4,092,488 tons of scrap, from which total consumers' stocks may be estimated at 4,760,000 tons. The Bureau of Mines is unable to estimate total stocks at suppliers' yards owing to incomplete returns received from this part of the trade.

Scrap consumption in September amounted to 3,078,100 tons, indicating that known stocks held by suppliers and consumers were equivalent to a 10-weeks' supply.

The bureau says:

"In appraising the significance of the stock figures reported herein, it should be borne in mind that the survery did not include stocks held by firms that produce and sell scrap incidental to manufacturing operations. Except for these, however, the canvass reached all branches of the trade engaged in the reclamation and use of iron and steel scrap under the economic conditions prevailing at the time of the survey. The figures likewise do not include any estimates of iron and steel scrap available in the many dumps and in abandoned plants and equipment scattered throughout the country that constitute the reservoir from which the scrap collector obtains a large part of his raw material. This potential supply rises and falls with changes in price levels but the quantity available at any given time is probably not amenable to statistical determination.

"As previously announced, the Bureau of Mines undertook this investigation to supply much-needed data on a highly essential industrial raw material. The survey was endorsed by the Army and Navy Munitions Board and the bureau gratefully acknowledges the generous support of that agency in this project, as well as the wholehearted cooperation of the American Iron and Steel Institute, the Institute of Scrap Iron and Steel, the National Association of Waste Material Dealers, and some 3500 companies that made the survey possible by contributing the data requested.

"At the request of the Army and Navy Munitions Board, the Bureau of Mines will undertake a second survey of the scrap iron and steel industry at the close of the year and in making this announcement, the bureau expresses the hope that a much larger number of scrap dealers and autowrecking companies will participate in order that more complete data on dealers' stocks of scrap may be supplied to Government agencies and the trade. The new canvass will be expanded to include a selected list of industrial plants that produce scrap for sale."

Details of the current investigation follow and a summary of statistics on

Summary of Reported Stocks of Iron and Steel Scrap and Pig Iron on Hand at Consumers' and Suppliers' Plants and in Transit, September 30, 1939, in Gross Tons

			Supplier	s' Stocks2	
				In Transit	
				to Yards	
	-Consume	rs' Stocks1-		or for	
		In Transit		Export and	
Item	At Plants	to Plants	'At Yards	at Docks	Total
Iron and steel scrap:					
Prepared scrap	2,229,989	302,407	1,772,970)		
Unprepared or partially prepared scrap.		*****	580,608		
			,	107,297	4,993,271
Total purchased scrap	2,229,989	302,407	2,353,578	107,297 .	4,993,271
Home scrap	1,551,402	8,690			1,560,092
Total scrap		311,097	2,353,578	107,297	6,553,363
Pig iron	3,068,014	91,071			3,159,085

¹ As reported by companies that consumed 86 per cent of total scrap used in 1938.

² As reported; coverage unknown.

Reported Stocks of Ferrous Scrap and Pig Iron on Hand and in Transit to Consumers' Plants on September 30, 1939, in Gross Tons

	Consumers' Stoc	ks
	In Transit	
At Plants	to Plants	Total ¹
. 880,309	130,413	1,010,722
. 336,000	49,595	385,595
. 139,272	25,431	164,703
. 303,220	24,415	327,635
. 571,188	72,553	643,741
2,229,989	302,407	2,532,396
1,318,098	815	1,318,913
	7,875	241,179
-	-	
. 1,551,402	8,690	1,560,092
-		-
3,781,391	311,097	4,092,488
3,068,014	91,071	3,159,085
	At Plants . 880,309 . 336,000 . 139,272 . 303,220 . 571,188 . 2,229,989 . 1,318,098 . 233,304 . 1,551,402 . 3,781,391	In Transit to Plants - 880,309

¹ As reported. Total consumers' stocks estimated as follows: purchased scrap 2,945,000 tons, home scrap 1,815,000 tons, total scrap 4,760,000 tons, and pig iron 3,458,000 tons.

Estimated Total Consumption of Ferrous Scrap and Pig Iron, by Type of Furnace. September, 1939, in Gross Tons

Type of Furnace		Scrap1		
.or Equipment	Home	Purchased ²	Total	Pig Iron ³
Open hearth	1,221,000	877,000	2,098,000	2,201,000
Bessemer	16,000	1,500	17,500	410,000
Electric	68,000	71,000	139,000	2,000
Cupola	220,000	305,000	525,000	274,000
Air	37,600	24,000	61,600	26,100
Blast	153,000	84,000	237,000	
Direct castings	*****	*****		133,000
		-		-
Total	1,715,600	1,362,500	3,078,100	3,046,100

¹According to September returns, with purchased scrap corrected on basis of September coverage compared to 1938 figures, and home scrap in proportion as indicated by September canvass.

² September canvass indicated coverage of 98 per cent of open-hearth furnaces, 99 per cent of Bessemer, 85 per cent of electric, 53 per cent of cupola, 81 per cent of air, 99 per cent of blast, and 40 per cent of direct castings as compared to 1938 coverage.

³ According to proportion of total scrap to pig iron as reported for September, 1939.

Proportion of Home and Purchased Scrap and Pig Iron Used in Furnace Charges in Year 1938 and Reported Used During Month of September, 1939, in Per Cent

		19	38			-Septem	ber, 1939-	-
	_	-Scrap-			_	-Scrap-	-	
Type of		Pur-		Pig		Pur-		Pig
Furnace	Home	chased	Total	Iron	Home	chased	Total	Iron
Open hearth	28.1	23.4	51.5	48.5	28.4	20.4	48.8	51.2
Bessemer	5.4	.2	5.6	94.4	3.8	.3	4.1	95.9
Electric	47.6	50.7	98.3	1.7	48.3	50.3	98.6	1.4
Cupola	26.4	37.1	63.5	36.5	27.5	38.2	65.7	34.3
Air1	48.2	21.4	69.6	30.4	42.9	27.3	. 70.2	29.8
Blast	71.8	28.2	100.0		64.6	35.4	100.0	

¹ Includes data for two Brackelsberg furnaces in 1938.

Summary of Companies Canvassed and Replies Received in Canvass of Ferrous Scrap Dealers, Automobile Wreckers, and Railroads, Sept. 30, 1939

	Number of Companies Canvassed	Mail Re- turned or Out of Business	Net Number Canvassed	Active Replies Received	Per Cent Returns from Net Number Canvassed
Dealers:					
Selected list	. 339	10	329	295	90
Others	. 3,594	393	3.201	1,410	44
		No. or State of State		N	
Total	. 3,933	403 .	3,530	1,705	48
Automobile wreckers	. 3,713	407	3,306	1,165	35
Railroads	. 67	* * *	67	67	100
	***********	-	-		****
Grand total	7,713	810	6,903	2,937	43

Reported Stocks of Iron and Steel Scrap on Hand at Suppliers' Yards and in Transit on Sept. 30, 1939, in Gross Tons

		Suppliers' Stocks					
		Scrap Iron	Automobile				
	Item	Dealers	Wreckers	Railroads	Total		
Prepared scra	p:						
No. 1 heavy	melting steel	420,029	8,709	76,184	504,922		
No. 2 heavy	melting steel	299,627	27,488	2,293	329,408		
Bundles		92,529	1,470	135	94.134		
Cupola grad	les	226,392	3,148	20,876	250,416		
All other .		388,432	21,849	183,809	594,090		
Total .		1.427.009	62,664	283.297	1.772.970		
Unprepared o	r partially prepared scrap	333,919	76,411	170,278	580,608		
and at doe	nsit to yards or for export		4,558	13,154	107,297		
Total se	erap	1.850.513	143.633	466,729	2,460,875		

a geographical basis will be released shortly.

Summary of stocks of scrap and pig iron.—The following figures are based on returns received from 595 consumers representing 86 per cent of the total scrap used in 1938; from 1705 of the 3530 dealers in iron and steel scrap canvassed; from 1165 of the 3306 autowrecking establishments canvassed; and from 67 large railroad companies.

Consumers' plants.—The following tables show reported stocks of iron and steel scrap and pig iron at the end of September as reported by consumers and the estimated total consumption of scrap and pig iron, by types of furnaces, during September.

On the basis of estimated total rate of consumption for September, consumers had on hand at the end of that month a nine-weeks' supply of purchased scrap, a five-weeks' supply of home scrap, and a five-weeks' supply of pig iron.

In 1938 open-hearth furnaces accounted for 66.4 per cent of the purchased scrap consumed, bessemers 0.0 per cent, electric furnaces 4.8 per cent, cupolas 24.5 per cent, air furnaces 1.3 per cent, and blast furnaces 3.0 per cent. In September, 1939, the percentages were 64.4, 0.1, 5.2, 22.4, 1.7, and 6.2 respectively.

The proportions of pig iron to total scrap used in September, 1939, by open-hearth and cupola furnaces, as compared with the year 1938, show significant changes. Open-hearth furnaces, which in 1938 used proportions of 28.1 per cent home scrap, 23.4 per cent purchased scrap, and 48.5 per cent pig iron, in September showed proportions of 28.4, 20.4, and 51.2 per cent respectively. Cupola furnaces, which in 1938 used proportions of 26.4 per cent home scrap, 37.1 per cent purchased scrap, and 36.5 per cent pig iron, in September showed proportions of 27.5, 38.2, and 34.3 per cent respectively.

The following table shows the percentage composition of charges to various types of furnaces in terms of scrap and pig iron.

Suppliers' yards.—The number of establishments engaged in buying and selling scrap is a subject upon which opinions in the trade vary widely. Some authorities maintain that the number exceeds 15,000, while others believe that a very large part of the business is done by less than a thousand companies. In compiling its mailing list, the Bureau of Mines used various trade directories and information

obtained from private sources. Questionnaires were finally mailed to 7713 companies including a selected list of 339 dealers representing most of the larger units in the trade, 3594 other dealers, 3713 auto-wrecking establishments, and 67 railroads which carried over 90 per cent of the revenue freight in 1938. Replies were received from 1705 scrap-iron dealers including almost complete returns from the larger units, 1165 auto wreckers, and 67 rail-

roads. Owing to limitations of time and personnel, no attempt was made to canvass the industrial plants that make and sell scrap, although many of the larger companies which reuse their own scrap have been included in the consumers' list. The results of this canvass are shown in the following tables.

While replies were received from only 43 per cent of the companies canvassed, it is believed by the Bureau of Mines that the tonnages reported represent a substantially higher proportion of total suppliers' stocks owing to the excellent response obtained from the railroads and the selected list of larger dealers. The Bureau of Mines, however, does not feel that the data reported are sufficiently comprehensive to justify estimation of the total stocks of iron and steel scrap held by nonconsumers.

Bureau of Mines Surveys Strategic Mineral Supplies

WASHINGTON—Studies looking to greater American selfsufficiency in strategic mineral supplies and the material effect European hostilities will have on the available supply of imported major products are subjects of two government reports just made public. Dr. John W. Finch, director of the Bureau of Mines, in his annual report, said the mineral industry surveys being conducted by the bureau in various Western states, economic studies focused upon mineral selfsufficiency and metallurgical research on the treatment of low-grade ores of manganese, chrome and other metals have given excellent preparation for the investigation of the possible value of domestic deposits of strategic minerals in times of emergency, which the bureau was directed by Congress

Immediately on the heels of Dr. Finch's report, the Tariff Commission issued a survey on the European war and United States. The commission said that many of the most important imports, such as tin, chrome ore, tungsten ore, manganese ore, rubber and other items originate in belligerent countries whose own demands are likely to increase sharply during the war, or in neutral countries whose shipping connections with the United States have been impaired since the outbreak of hostilities.

War's Effects Vary

The war, said the commission, will have a widely varying effect on the different import commodities, depending upon location of sources, the facility with which producing countries can ship to the United States, the belligerent or neutral status of the producing country, the essential nature of the product for war purposes

and the desire of belligerents to maintain exports of some products to the United States in order to obtain needed foreign exchange here. Imports from South America and other areas distant from the zone of belligerent action, it was pointed out, are less likely to be affected than those from Europe. For many products, it was stated, import trade may be expected to follow a different pattern from the World War because of changed conditions in production and consumption in the United States and abroad. Reference is also made to the possibility of increasing the domestic production of similar or substitute products in the event the United States is faced with a shortage of imports as the result of the war.

In the bureau report, Dr. Finch said it is proposed to study the occurrence of ores of strategic minerals to determine their tenor, and to estimate mining costs so that, in an emergency, such information will be available. Work has already been started on eight projects in as many states, embracing deposits of antimony, chrome, manganese, tin and tungsten. It is hoped, Dr. Finch stated, that results will justify continuance of this work to the point where the bureau can prepare a relatively complete inventory of the nation's deficient mineral reserve.

Electrolytic Manganese

The process for making electrolytic manganese, developed and patented by the bureau, will be applied in a commercial plant utilizing electric energy supplied by facilities of the Tennessee Valley Authority. Definite progress, it was said, has been made in the study of methods for producing pure sponge chromium from chromium chlorides and in devising a process for the manufacture of magnesium metal from magnesites.

"The gigantic dam projects recently finished or nearing completion will bring tremendous supplies of electrical energy to regions abundant in minerals but lacking facilities for their preparation at low cost," said the report. "One of the most interesting features of the bureau's technologic work is to study these minerals, determine their characteristics, and endeavor to find new uses for them. It is hoped that promising opportunities for new domestic industries may thus be brought before the public."

Highlights on the Tariff Commission's report on metallic products follow:

TIN: No domestic production. Only small imports of ore. Domestic requirements supplied by imports of tin in bars, blocks, etc. About one-third of domestic consumption used for tin plate for containers and roofing sheets; remainder for alloys, etc. Output in British and Dutch possessions, chief supplying sources, and in Bolivia and Nigeria closely controlled by agreement and smelting operations are conducted mostly in Straits Settlements, the United Kingdom and the Netherlands. Ore production of British Malaya and Netherlands Indies could be rapidly increased if necessary. Major limiting factor in world tin supply is long-distance transportation, but value of tin is so high and it is so essential for war purposes that only marked shortage of shipping would probably affect its movement. **** If requirements for tin increase in United States and if war demands increase in Europe there may be resulting increased demand for tin smelted in Straits Settlements and Netherlands Indies.**** British government in position largely to control amount of tin which non-producing countries can obtain. Its need for dollar exchange will probably be factor in determining its exercise of this

control over shipments to the United States.

UNMANUFACTURED COPPER: United States in no way dependent on foreign countries. European sources very inadequate. Question whether imports into United States, for processing, from Latin-America will increase or decrease under war conditions depends chiefly on relative difficulty of transportation to Europe through United States as compared with direct transportation. United States and Canada could increase production in short time to care for both home requirements and for larger participation in Europe's supply. This might, however, involve operation of highercost mines and material increase in prices.

NICKEL AND ALLOYS: Practically all United States requirements of nickel imported. Imports, almost wholly from Canada, are about 85 per cent of metal and 15 per cent of matte. Domestic production largely from imported matte or from treatment of scrap, the scrap being in its ultimate derivation also from imports. Imports of nickel matte used predominantly for making monel metal in American plant of Canadian company which is world's largest producer of nickel. Canadian production can be increased within comparatively short time. Impossible to secure large imports from sources other than Canada.

Manganese, 35 per cent or more: Imports supply 96 per cent of grade used by steel industry, of which nearly 40 per cent comes from Soviet Union by way of Mediterranean sea. Imports from Mediterranean might dedecline by reason either of indisposition of Soviet Union to sell so much to this country or of transportation difficulties through Black and Mediterranean Seas. Brazil might supply 50 per cent of requirements under proper price conditions and Cuba might expand its output to some extent. United States capital has substantial interest in both Brazilian and Cuban mines. Gold Coast (of Africa) and India, both important import sources, might increase output, but are controlled by United Kingdom, whose requirements are expected to increase sharply as result of war. Domestic production of manganese suitable for steel making could be greatly expanded only at increased cost and with considerable difficulty. Notwithstanding great demand for manganese and difficulty of obtaining foreign supplies during last war, domestic production was stepped up only gradually and at peak in 1918, was far from sufficient for requirements.

CHROME ORE: Imports supply 99 per cent of domestic requirements. About one-half of imports since 1935 have come from South Africa which, with Philippine Islands and Turkey, supply grades used in steel industry. World demand likely to increase as result of war in Europe. Generally, ore must be transported long distances from producing to consuming countries and transportation and insurance costs likely to increase considerably under war conditions. If United States is faced with shortage of imports and prices rise greatly, domestic production probably will increase. Appears unlikely, however, that domestic output can be expanded to supply more than 20 per cent of domestic requirements, estimated at about 500,000 gross tons annually (chromium content about 48 per cent of gross weight) in good business vear.

IRON ORE: United States supplies ample. Imports, averaging over 2,000,000 gross tons annually in 1936-38, supply less than 5 per cent of requirements. They are utilized almost exclusively by blast furnaces along Atlantic Seaboard. Come largely from Chile, where Bethlehem Steel Co. owns important deposits. Bethlehem also owns deposits in Cuba. As result of war, United States exports to Canada and possibly to Europe may tend to increase.

ZINC: United States produces onethird or more of world supplies, and is largest producer. No procurement problems are expected even under wartime demand.

TUNGSTEN ORE AND CONCENTRATES: United States production supplies about 40 per cent of domestic consumption in years of large use and much higher percentage in times of diminished use. Exports practically all of advanced products with benefit of drawback of duties paid on imported ore used. Chief sources of imports are China and British Malaya, and minor sources are Australia, Bolivia, Argentina, Peru, Mexico and South Africa. Burmese ore contains tin and tungsten combined for which treatment facilities in United States are not available. In 1938 most of imports, totaling 414 net tons, (tungsten content) were treated in bond and the product reexported, whereas in 1936 and 1937 only about 10 per cent had been so treated. China, because of Japanese invasion, no longer dependable source of supply. Supplies from British Malaya, South Africa and Australia subject to preference claims of United Kingdom. Only around 130 tons of tungsten in ore per year generally arrives from Latin-America but production in those countries of contained tungsten during 1925-33 and thereafter increased regularly to 1660 tons in 1937. Seems probable that if prices should rise sufficiently domestic mines in operation now or within last four years could produce about 2200 tons of tungsten contained in ore, say half of 1937 requirements or half of average requirements for 1916-17 period.

Possibility of increased production depends to considerable extent upon operation of properties which have not been in production recently or have not yet reached production stage. Any initial increase in output must be from mines now producing. Stocks in government bonded warehouses at close of 1938 contained 326 tons and domestic producers' stocks 459 tons of tungsten in ore. Possible imports from Mexico, Argentina, Bolivia and Peru are estimated at 1800 net tons of contained tungsten, and could be attained only if those countries reduced exports to Europe. Bolivian tungsten has been exported principally to Germany. War conditions may prevent shipments to certain European countries but they may also increase demand of others for Latin-American tungsten.

Reich Unable to Supply Freight Cars to Argentina

WASHINGTON — Germany, according to reports received by the Commerce Department's Transportation Division, has abandoned hope of supplying freight cars and other railway equipment to Argentina in exchange for wheat and meat.

From unofficial sources, the division learned that under terms of the agreement Germany was to supply Argentina with railway equipment including 900 flat cars and parts, 30 sleeping cars, and 64 light diesel switching locomotives. Argentine officials were reported to have stated at the end of September that Germany had failed to deliver any of the equipment despite the shipment of Argentine wheat to Germany.

According to the American Consulate General, Germany is arranging to make payment for wheat already received and to obtain return of a deposit placed with the Argentine State Railways as a guarantee.

High Court Avoids Anti-Trust Law and Union Controversy

WASHINGTON—The Supreme Court declined on Monday to rule on the question of whether the activities of labor unions are covered by the anti-trust laws-a controversial issue which has been the subject of a recent interchange of correspondence between the Department of Justice and the American Federation of Labor. The court handed down a decision in the Chicago milk case, reinstating an anti-trust indictment against the Chicago milk industry, but at the same time turned aside the question involving the anti-trust law's applicability to union activities with the comment that the issue was not involved in the

"The (Illinois Federal) District Court did not construe the Sherman Act as inapplicable to these defendants and the government's appeal . . . does not present that question," the court said in a unanimous opinion written by Chief Justice Hughes.

Murphy Upholds Arnold

The labor angle in the case was raised by the Department of Justice's allegation that an AFL teamsters union cooperated with efforts to fix prices by creating labor troubles for firms cutting prices.

The Justice Department's argument

in the Chicago milk case was mentioned in a letter written last Saturday by Attorney General Frank Murphy to AFL President William Green, in which Mr. Murphy upheld the contention of Assistant Attorney General Thurman Arnold that unions could and would be prosecuted under the Sherman Act if they engaged in restraints of commerce not related to legitimate objectives such as wages, hours, and working conditions and collective bargaining.

In reply to Mr. Green's question of whether the Arnold view represented the Justice Department's attitude on the matter, Mr. Murphy answered in the affirmative, pointing out that the Supreme court had sustained the view in several opinions and that the AFL's own general counsel, Joseph Padway, conceded this was the case when he appeared before the court during arguments on the Chicago milk case to ask that these previous opinions be overruled.

"In the enforcement of criminal statutes it is the practice of the department to follow the construction placed on them by the Supreme Court," the Attorney General said. "In doing so in this instance, the anti-trust division has followed the usual practice, and I would not be justified in interfering

with that course. As I said in my anti-trust statement of May 18, 1939, the policy of enforcement should not vary according to the individual views of the official charged with enforcement."

Allegheny Ludlum to Enlarge Buffalo Foundry Plant

PITTSBURGH—Allegheny Ludlum Steel Corp. has purchased the physical property of its Buffalo Foundry division and has embarked on a renovation and repair program which will soon result in a greater production of stainless steel castings at that plant. Heretofore this property had been leased since December, 1936. A description and technical analysis of operations at Allegheny Ludlum's Buffalo plant appeared in The Iron Age, issue of Jan. 8, 1937, page 18.

Expansion plans include the installation of a second large electric furnace and an enlarging of the present building. This project has already begun and will be completed as speedily as possible,

Power-Driven Machine Exports Up in October

WASHINGTON — Shipments of power-driven metal-working machinery abroad during October were valued at \$9,121,340, a 21 per cent increase over the exports in October, 1938, according to the Commerce Department's Machinery Division.

Southern Blast Furnace and Raw Material Men

AT a recent dinner of the newly organized Southern Blast Furnace and Raw Materials Association the camera snapped the following members seated at the speakers' table: (left to right) E. R. Merrill, chairman program committee: Francis Crockard, secretary-treasurer; C. S. Lawson, director; John E. Urquhart, vice-president; C. L. Bransford, president; G. M. Harris, J. M. Spearman and Fred Osborne, directors.



November Pig Iron Output at 90.9 Per Cent of Capacity

PRODUCTION of coke pig iron in November totaled 3,720,436 gross tons, compared with 3,627,590 tons in October. On a daily basis November production gained 5.9 per cent over that in October, from 117,019 tons to 124,015 tons in November, which was the highest daily rate since May, 1929, at 125,745 tons, the highest on record. The rate of operation last month was 90.9 per cent of the industry's capacity, as compared with 85.9 per cent in October.

There were 191 furnaces in blast on Dec. 1, a gain of three over the 188 in blast on Nov. 1. For the second successive month the number in operation was the highest since Nov. 1, 1929, when there were 203 furnaces operating. The operating rate of the 191 furnaces in blast on Dec. 1 was 124,085 tons a day, compared with 120,565 tons on Nov. 1. Four furnaces were blown in and one was put out for relining.

Furnaces blown in included: one Mingo and one Gary, Carnegie-Illinois Steel Corp.; Trumbull-Cliffs furnace, of Republic Steel Corp., and Sheridan, of E. J. Lavino & Co.

The Ironton furnace of Columbia Steel Co. was blown out for relining.

The number of available furnaces has been reduced from 239 to 236 by the abandonment of the old Witherbee, Sherman & Co. and Chateaugay Ore & Iron Co. furnaces by their present owner, Republic Steel Corp.

Production of Coke Pig Iron and Ferromanganese

	ross Tons Iron*	Ferromanganeset			
1939	1938	1939	1938		
January 2,175,423 February 2,060,187	1,429,085 1,298,268	20,805 18,655	22,388 20,205		
March 2,394,615 April 2,056,177	1,452,487 1,376,141	16,008 11,518	21,194 18,607		
May	1,255,024 $1,062,021$	7,888 16,617 91,491	13,341 14,546 110,281		
½ year12,522,369 July 2,356,270 August 2,659,813	7,873,026 1,201,785 1,493,995	21,213 20,628	20,818		
August 2,659,813 September 2,878,556 October 3,627,590	1,680,435 2,052,284	21,949 23,944	630 3,621		
November 3,720,436 December	2,269,983 2,210,728	30,356	13,156 19,197		
Year	18,782,236		173,791		

*These totals do not include charcoal pig iron. †Included in pig iron figures.

Daily Average Production of Coke Pig Iron

	Gross To	ms		
1939	1938	1937	1936	1935
January 70,175	46,100	103,597	65,351	47,656
February 73,578	46,367	107,115	62,886	57,448
March 77,246	46,854	111,596	65,816	57,098
April 68,539	45,871	113,055	80,125	55,449
May 55,404	40,485	114,104	85,432	55,713
June 70,615	35,400	103,584	86,208	51,570
½ year 69,184	43,497	108,876	74,331	54,138
July 76,009	38,767	112.866	83,686	49,041
August 85,800	48,193	116,317	87,475	56,816
September 95,952	56.015	113,679	91,010	59,216
October117,019	66,203	93,311	96,512	63,820
November124,015	75,666	66,891	98,246	68,364
December	71.314	48,075	100,485	67,950
Year	51,458	100,305	83,658	67,556

Merchant Iron Made, Daily Rate

		Tons			
	1939	1938	1937	1936	1935
January	10,603	10,635	16,106	10,537	3,926
February	9.637	8,854	16,514	11,296	6,288
March	8,951	8.524	16,457	10,831	7,089
April	8,508	8,273	14,517	13,897	8,799
May	7,038	6,431	19,483	12,814	8,441
June	7,613	5,375	15,870	14,209	7,874
July	8.396	5,495	19,609	11,619	8,644
August	10,022	6,614	17,831	12,148	8,194
September	11.293	11,205	20,065	12,526	10,090
October	14,651	10.799	18,950	13,645	11,199
November	14,859	13,208	15,662	14,739	12,503
December		9,130	10,964	14,852	13,312

Production by Districts and Coke Furnaces in Blast

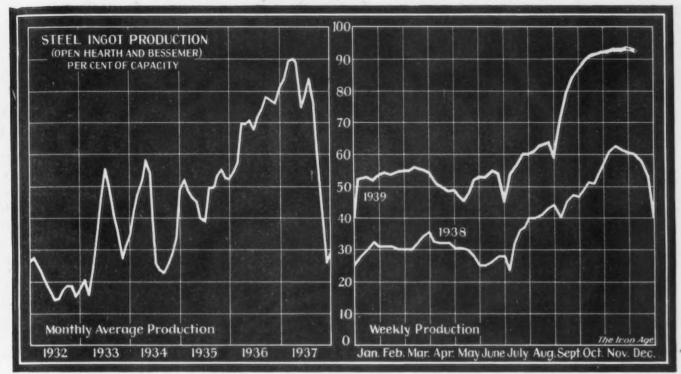
	Production (Gross Tons)		Dece	ember 1	November 1		
FURNACES	November (30 Days)	October (31 Days)	Number In Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day	
New York: Buffalo	999 00=	997 540	11	7,770	11	7,725	
Other New York and Mass	233,095 13.031	237,540 16,000	11	435	1	515	
Pennsylvania:	10,001	10,000		100		010	
Lehigh Valley	86,130	80,066	5	2,870	5	2,585	
Spiegeleisen	9,420	8,087	2	315	2	295	
Schuylkill Valley	44,377	35,946	3	1,480	3	1,545	
Susquehanna and Lebanon Valleys	25,585	15,273	1	855	1	495	
Ferromanganese	918	804.975	39	50	40	27,745	
Pittsburgh District Ferro. and Spiegel	830,484 8,828	5,502	39	27,685 295	10	175	
Shenango Valley	68,627	55,829	4	2,290	4	2,205	
Western Pennsylvania	106,042	104.034	7	3,535	7	3,455	
Ferro, and Spiegel	13,723	13,364	i	455	i	430	
Maryland	179,119	184,661	6	5,970	6	5.955	
Wheeling District	174,938	163,212	9	6.030	8	5,395	
Ohio:							
Mahoning Valley	377,550	366,525	18	12,675	17	11,820	
Central and Northern	307,656	317,653	15	10,255	15	10,245	
Southern	60,160	57,191	30	2,055	5 29	$\frac{1,845}{22,675}$	
Illinois and Indiana Michigan and Minnesota	720,024 128,475	700,654 128,697	7	24,000 4,285	-7	4.280	
Colorado, Missouri and Utah.	48,714	47.880	3	1.375	4	1.840	
The South:	10,121	********		2,010		2,010	
Virginia			0		0		
Ferromanganese	3,100	2,959	1	105	1	95	
Kentucky	25,315	25,733	2	845	2	830	
Alabama	251,338	256,690	17	8,380	17	8,280	
Ferro. and Spiegel	3,787	2,119	1	125	1	135	
Tennessee			0	* * * *	0		
Total	3,720,436	3,627,590	191	124,085	188	120,565	

United Engineering to Make Corronizing Equipment

PITTSBURGH — Standard Steel Spring Co., Corapolis, Pa., United Engineering & Foundry Co., Pittsburgh, and Hanson-Vanwinkle Munning Co., Mattewan, N. J., have concluded negotiations under which United Engineering will make available to licensees of the Corronizing process necessary facilities for utilization of the process.

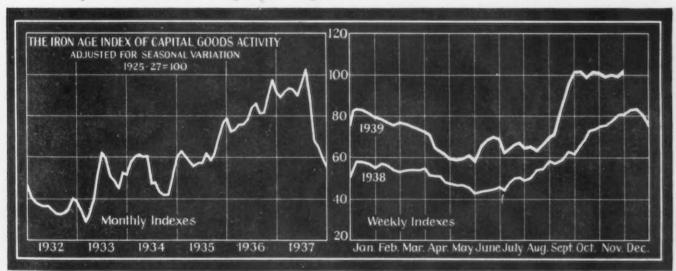
Standard Steel Spring developed the electroplating process known as Corronizing and controls the issuance of licenses to users. Pittsburgh Steel Co. and Sharon Steel Corp. have recently obtained licenses. Among other licensees are Carnegie-Illinois Steel Corp., Republic Steel Corp. and Youngstown Sheet & Tube Co.

Ingot Rate Drops One Point to 931/2% of Capacity



| Pitts-burgh | Chicago | Valleys delphia | Cleve-burgh | Chicago | Valleys delphia | Chicago | Chicago | Valleys delphia | Chicago | Chicago | Valleys delphia | Chicago | Chicago | Chicago | Valleys delphia | Chicago | Chicago | Chicago | Chicago | Valleys delphia | Chicago | Chicago | Chicago | Chicago | Chicago | Chicago | Valleys delphia | Chicago | Chic

Heavy Goods Output Higher; Index at 27-Month Peak



TATISTICS covering the past week indicate that activity in the production and distribution of durable goods were on a slightly higher plane, as compared with the preceding week, in most industries, while in some were unchanged. In no case was a decline reported. Automobile assemblies rose sharply to 93,638 units, the highest level in almost a year; construction contracts were up close to \$10,000,000 with the cumulative total for the year to date 11½ per cent in excess of the 12-month total of 1938; iron and steel production in the Pittsburgh area was further intensified, and lumber carloadings, on a daily basis, gained 667 cars. Actual steel output and the seasonal correction applied to this factor both rose one percentage point, leaving the adjusted index unchanged. Reflecting this improvement, The Iron Age capital goods index gained 2.6 points in the week, putting the combined

index figure at 101.6, the highest position reached by the index in 27 months.

	Week Ended			Comparable		
	Dec. 2	Nov. 25	1938	1929		
Steel ingot production'	140.7	140.7	92.8	95.8		
Automobile production ²	89.1	84.4	94.4	68.7		
Construction contracts3	81.0	80.4	82.9	106.8		
Forest products carloadings4.	75.7	69.5	60.1	120.1		
Production and shipments, Pittsburgh District ⁵		120.1	71.9	105.6		
Combined index	101.6	99.0	80.4	99.4		

Sources: ¹The Iron Age; ²Ward's Automotive Reports; ³Engineering News-Record; ⁴Association of American Raliroads; ⁵University of Pittsburgh. The indexes of forest product carloadings and activity in the Pittsburgh area reflect conditions as of the week ending Nov. 25. Other indexes cover the week of Dec. 2.

SUMMARY OF THE WEEK

- ... New orders continue to decline, but backlogs are still heavy.
- ... Steel output off slightly this week; November pig iron total a near record.
- ... Wire rod prices placed on net ton basis; other slight changes made.

DOWNWARD trend in new steel orders is more definitely discernible this week, but the aggregate backlogs of steel companies have not been materially reduced. In some products, notably sheets and strip and to a slightly lesser extent in bars, most of the major producers are well sold through the first quarter, February and March deliveries being the earliest obtainable on requirements not already covered.

Accompanying the downward trend of new orders is a drop of one point in the industry's rate to 93½ per cent for this week, but there is no connection between the two, the decline in operations, which has occurred in only a few districts, being mainly accounted for by equipment repairs rather than a decrease in tonnage available for rolling.

Nearby prospects are enhanced by the return to production of the Chrysler automobile plants, which had enough steel on hand for initial assemblies, but will require more for January and subsequent months. Railroad demand for steel is insistent. About 250,000 tons will be required in the early part of 1940 for equipment orders that have been placed. New buying by the railroads centers on motive power, orders having been placed within the week for 27 locomotives.

Export business is expected in good volume during the first quarter as a result of possibly open spaces on mill schedules and an easing in export prices, some of the premiums recently quoted having already been reduced considerably. The removal of duties on imported steel by Great Britain may be the forerunner of purchases here. The British purchasing commission has issued initial inquiries for several hundred thousand shells, but it is not certain whether the business will be placed in the United States or Canada.

OW that first quarter prices have been made known, steel consumers are arranging with the mills for definite delivery dates on their reservations for the coming three months and these negotiations indicate an expectation among nearly all steel users that the tonnage they have placed on mill books will all be taken out during the next quarter. Nevertheless some easing in the breakneck speed of the past two months is expected after the turn of the year, but no precipitate decline in production is envisaged.

Further clarification of first quarter prices has come

within the past few days. Of outstanding importance is the change in the basis of selling wire rods from a gross ton to a net ton. New prices for this commodity are 2c. a lb., Pittsburgh, Chicago and Cleveland, for the base sizes, No. 5 to 9/32 in., and 2.15c. a lb. for over 9/32 in. to 47/64 in., inclusive, these changes increasing the prices for the base sizes 8c. per 100 lb. Quantity extras applying to five tons or less of a size or grade range from 10c. to 20c. per 100 lb., excepting that five tons or more of one size and grade when shipped in a full carload take the base price.

Other price changes include an advance of \$2 a ton on tight cooperage hoops in line with rises on sheets and strip and \$2 higher extras on commodity strip in coils, conforming to a similar change on cold rolled sheets in coils. Tin plate prices have been reaffirmed for the first quarter.

No announcement has been made regarding pipe prices, and, while there is no definite indication of an advance, producers believe they are entitled to one in view of the fact that standard black pipe is \$8 and galvanized pipe \$10 a ton below the quotations that were in effect during the first half of 1938.

One pig iron producer has reaffirmed present quotations for the first quarter, while others are taking business without formal announcement. A Jackson County, Ohio, producer has advanced silvery iron \$1 a ton.

S CRAP prices are weak in all districts, declines at Chicago and Philadelphia bringing about a further revision in The Iron Age scrap composite price to \$18.25. A survey completed by the United States Bureau of Mines discloses that iron and steel scrap stocks at consumers' and dealers' plants at the end of September exceeded 7,220,000 gross tons, which, on the basis of September consumption, were equal to a nine weeks' supply of purchased scrap and a five weeks' supply of home scrap and a five weeks' supply of pig iron. This evidence of ample scrap supplies may contribute to price weakness, but a further factor is that export shipments are backed up because of a lack of boats.

Although steel production in November was the highest on record, pig iron output last month fell a little short of the daily record of 125,745 tons in May, 1929. Last month's daily average was 124,015 tons. The month's total was 3,720,436 tons compared with 3,627,590 tons in October. The gain over October on the daily basis was 5.9 per cent. There were 191 furnaces in blast on Dec. 1, a gain of three over the 188 that were active on Nov. 1. The rate of operation last month was 90.9 per cent of the industry's capacity compared with 85.9 per cent in October. The number of available furnaces has been reduced from 239 to 236 by the scrapping of one Chateaugay and two Witherbee, Sherman stacks by their present owner, The Republic Steel Corp.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel					Cents Per Lb.: Dec. 5, 1939	Nov. 28, 1939	Nov. 7, 1939	Dec. 6, *1938
Per Gross Ton:	1939	Nov. 28, 1939	1939	Dec. 6, •1938	Wire nails: Pittsburgh, Chi- cago, Cleveland, Birming-			
Rails, heavy, at mill\$ Light, rails: Pittsburgh, Chi- cago, Birmingham	40.00	\$40.00 40.00	\$40.00 40.00	\$40.00 40.00	Plain wire: Pittsburgh, Chicago, Cleveland, Birming-	2.55	2.55	2.45
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland,					Barbed wire, galv.: Pitts-	2.60	2.60	2.60
Cago, Brittingham Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Bir- mingham, Sparrows Point. Sheet bars: Pittsburgh, Chi-	34.00	34.00	34.00	34.00	burgh, Chicago, Cleveland, Birmingham	3.40	3.40	3.20
town, Buffalo, Canton,		24.00	94.00	24.00	Pittsburgh and Gary \$5.00	\$5.00	\$5.00	1\$5.00
Sparrows Point Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngs- town, Buffalo, Birmingham,	34.00	34.00	34.00	34.00	*Pittsburgh prices only. †Applies to 80-rod spools only. ‡Subject to post-season adjustment.			
Sparrows Point	34.00	34.00	34.00	34.00	Pig Iron Per Gross Ton:			
Youngstown, Buffalo, Bir-					No. 2 fdy., Philadelphia\$24.84	\$24.84	\$24.84	\$22.84
mingham	40.00	40.00	40.00	40.00	No. 2, Valley furnace 23.00 No. 2, Southern Cin'ti 23.06	23.00 23.06	23.00 23.06	21.00 21.06
land	43.00	43.00	43.00	43.00	No. 2, Birmingham	23.00 24.34 22.50	19.38 23.00 24.34 22.50	17.38 21.00 22.34 20.50
Point, cents per lb	1.90	1.90	1.90	1.90	Malleable, Chicago† 23.00 Malleable, Valley 23.00 L. S. charcoal, Chicago 30.34	23.00 23.00 30.34	23.00 23.00 30.34	21.00 21.00 28.34
*Changed to net ton basis.					Ferromanganese, seab'd car- lots100.00	100.00	100.00	92.50
Finished Steel								
Cents Per Lb.: Bars: Pittsburgh, Chicago,					†The switching charge for delivery cago district is 60c. per ton.	to roun	dries in	the Chi-
Gary, Cleveland, Buffalo, Birmingham	2.15	2.16	2.15	- 2.25	Scrap			
Gary, Birmingham, Spar- rows Point, Cleveland, Youngstown, Coatesville,					Per Gross Ton: Heavy melting steel, P'gh\$18.75 Heavy melting steel, Phila 19.25	\$18.75 19.75	\$21.50 21.75	\$15.75 14.75
Structural shapes: Pittsburgh,	2.10	2.10	2.10	2.10	Heavy melting steel, Ch'go 16.75 Carwheels, Chicago 16.00 Carwheels, Philadelphia 20.75	17.25	18.625 17.50	13.75 12.50
Chicago, Gary, Buffalo, Bethlehem, Birmingham Cold finished bars: Pitts-	2.10	2.10	2.10	2.10	No. 1 cast, Philadelphia 20.7a No. 1 cast, Philadelphia 20.75 No. 1 cast, Chigo (net ton) 14.50	19.75 21.75	22.25 22.25 24.25 16.25	16.75 15.50 16.75 12.50
burgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70	To I case, on go the ton? 14.00	10.00	10.20	1.2.00
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem,					Coke, Connellsville			
massilion or Canton	2.70	2.70	2.70	2.80	Per Net Ton at Oven:			
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown,					Furnace coke, prompt \$5.00 Foundry coke, prompt 5.75		\$5.00 5.75	\$3.75 4.75
Birmingham	2.10	2.10	2.00	2.15	Non-Ferrous Metals			
Cleveland Voungetown	2.80	2.80	2.80	2.95	Cents per Lb. to Large Buyers:			
Sheets, galv. No. 24: Pitts- burgh. Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham. Hot rolled sheets: Pittsburgh,	3.50	3,50	3.50	3,50	Copper, Electrolytic, Conn 12.56 Copper, Lake, New York 12.56 Tin (Straits), New York 52.06 Zinc, East St. Louis 6.00	12.50 12.50 54.50	12.50 12.50 ••54.50	11.25 11.375 46.25
Gary, Birmingnam, Bunaio,	0.00	9.00	0.00	7,00	Zinc, East St. Louis 6.00 Zinc, New York 6.35	6.50	6.50	4.50
Sparrows Point, Cleveland, Youngstown, Middletown. Cold rolled sheets: Pittsburgh,	2.10	2.10	2.00	2.15	Zinc, New York 6.38 Lead, St. Louis 5.35 Lead, New York 5.56 Antimony (Asiatic), N. Y. 16.56	5.35 5.50 16.50	5.35 5.50 16.50	4.70 4.85 14.00
Gary. Buffalo, Youngstown,					**Nominal.			

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Dec. 5, 1939 One week ago One month ago One year ago	2.261c. a Lb. 2.261 2.236	\$22.61 a Gross Ton 22.61 22.61 20.61	\$18.25 a Gross Ton 18.58 20.63 14.75
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on average for basic fron at Valley furnace and foun- dry iron at Chicago, Philadel- phia, Buffalo, Valley and South- ern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh. Philadelphia and Chicago.
	High Low	HIGH LOW	HIGH LOW
1939 1938 1937 1936 1935 1934 1932 1932 1932 1932 1930	2.286c., Jan. 3; 2.236c., May 16 2.512c., May 17; 2.211c., Oct. 18 2.512c., Mar. 9; 2.249c., Jan. 4 2.249c., Dec. 28; 2.016c., Mar. 10 2.062c., Oct. 1; 2.056c., Jan. 8 2.118c., Apr. 24; 1.945c., Jan. 2 1.953c., Oct. 3; 1.792c., May 2 1.915c., Sept. 6; 1.370c., Mar. 15 1.981c., Jan. 13; 1.883c., Dec. 29 2.192c., Jan. 7; 1.962c., Dec. 9 2.223c., Apr. 2; 2.192c., Oct. 29 2.192c., Dec. 11; 2.142c., July 10	\$22.61, Sept. 19: \$20.61, Sept. 12 23.25, June 21: 19.61, July 6 23.25, Mar. 9: 20.25, Feb. 16 19.73, Nov. 24: 18.73, Aug. 11 18.84, Nov. 5: 17.83, May 14 17.90, May 1: 16.90, Jan. 27 16.90, Dec. 5: 13.56, Jan. 3 14.81, Jan. 5: 13.56, Dec. 6 15.90, Jan. 6: 14.79, Dec. 15 18.21, Jan. 7: 15.90, Dec. 16 18.71, May 14: 18.21, Dec. 17 18.59, Nov. 27: 17.04, July 24	\$22.50, Oct.

THIS WEEK'S MARKET NEWS

STEEL OPERATIONS

... Rate down one point to 931/2%

THE first decline recorded in The Iron Age weekly estimates of steel ingot production since June (excepting holiday weeks) has occurred this week. Our estimate of this week's production is 93½ per cent compared with 94½ per cent for last week.

Operations were lower in some districts, but not in all. The Pittsburgh district is off one point to 93 per cent, but the decline there is not due to lack of tonnage for rolling but to production factors. The Wheeling-Weirton area is unchanged at 93 per cent. A drop of five points at Youngstown brings the rate there down to 88 per cent. In the Cleveland-Lorain district the rate is down one point to 87 per cent. The Chicago rate is unchanged at 94 per cent. Buffalo is off two and a half points.

A gain has occurred in the Eastern Pennsylvania district, where operations are at one point higher at 91 per cent.

PRICES

. . . Hoops higher . . . Wire rods placed on net ton basis

In addition to the adjustment in hot rolled sheets and strip, a similar upward revision of \$2 a ton has been made in tight cooperage hoops, making this product quotable at 2.20c. a lb. f.o.b. Pittsburgh.

Tin mill products on Dec. 1 were reaffirmed by Carnegie-Illinois for first quarter shipment.

Price changes on hot rolled sheets and strip became effective on Nov. 28, the date on which public announcements were made by Carnegie-Illinois.

The conversion of wire rod prices to a net ton basis instead of a gross ton basis, which will result in a slight upward revision in the lighter gages, becomes effective Jan. 1, 1940.

The reaffirmation of first quarter prices except for sheets and strip has had little influence on the receipt of new business. A continuation of the current downward trend in orders is expected, but this is attributed more to supply and demand factors than to price.

Reports of price cutting in concrete bars are again being heard in the Chicago market, some business having been lost to bids of \$3 a ton off.

A major CHICAGO steel producer which has not yet announced first quarter prices may not adhere to the revised extra schedules on sheets now being used by some other companies.

Jones & Laughlin Steel Corp. on Dec. 5, reaffirmed prices on its products after making certain price and extra adjustments on hot rolled sheets and strip and hot rolled rods to meet price conditions established by other producers.

NEW BUSINESS

... Downward trend of new orders is more clearly in evidence

RESH orders at PITTSBURGH continued the leveling off process in the past week but total specifications, including releases against earlier orders, were still of sufficient volume to prevent any reduction in the total backlogs of that district. In some products, unfilled tonnages were reduced but, as was the case a week ago, actual increases were recorded in the backlogs of other products.

Panhandle Eastern Pipe Line Co., Kansas City, is this week expected to place orders for 140 miles of 22- and 24-in, line pipe totaling approximately 25,000 tons of steel. This pipe will be utilized for loops in the company's main line between Liberal, Kan., and Springfield, Ill.

If all present plans and reservations materialize, some steel mill units in the CLEVELAND and YOUNGSTOWN areas are booked through the first quarter of 1940. The business is predominantly domestic. Although South American and Far Eastern inquiries continue numerous, the actual ratio of export orders to aggregate tonnage on the books is slightly lower than few months ago.

Shipments are lagging behind rollings at a few plants. Some relief may be provided in late December and early January when for purposes of inventory certain consumers are not anxious for shipments. This would not influence rolling mill operations this year, in all probability.

Most Chicago sellers report a smaller volume of new business during November than in the previous month. One large producer, however, is understood to have booked more tonnage than was shipped. That the generally downward trend will continue is taken for granted in the Chicago area, and is expected to last through January and perhaps longer.

The consensus of Chicago steel sellers is that some consumers have orders on the books for their full first quarter needs, but that most of the buyers in this district have yet to place their early 1940 requirements. As this report has mentioned previously, over 250,000 tons of steel will be bought in the first quarter for railroad cars alone. Though pressure for deliveries continues strong, many customers are gradually building up normal inventories. Few steel processors are believed to have excessive stocks, however.

With first quarter prices unchanged for the most part, some of the urgent need for delivery has disappeared. As a result of this situation, one CHICAGO mill is able to push some orders ahead on the schedule and take care of those steel users who are hard pressed.

At least one producer in Chicago is concentrating heavily on the low priced sheet tonnage still on the books from last May in an effort to clean it up by Dec. 31. Others expect a slight carryover into first quarter on these cheap sheets, but say that only a few weeks at most will be necessary.

New bookings in the PHILADELPHIA district in the past week were in moderate volume, somewhat below the current rate of output. Despite the pronounced slackening in the number of new orders received over the past two weeks, November as a whole was the best month experienced in the past 10 years. The lessened buying pressure has resulted in some improvement in deliveries, notably plates. The larger plate producers can now ship in four to five weeks, while the smaller independent mills can make deliveries in two or three weeks. Fairly prompt shipment of cold finished bars can still be obtained, but in sheets, strip, bars and wire February or March is about the best that can be done. Deferments have been surprisingly few in number

following the reaffirmation of prices. The re-establishing of present prices, however, has brought a noticeable reduction in consumers' pressure for shipment. One exception to this trend is the railroads, which are still exerting considerable pressure to obtain prompt shipment, in some cases supplementing mill shipments with jobber purchases.

In the New York district there has been a noticeable downward trend in new orders, but November was the second best month of the year for some of the larger producers, October having been first and September the third. However, companies which are predominantly makers of sheets and strip had their best month in September.

At BUFFALO fresh demand has tapered off during the past week. Backlogs are reasonably high, but the first intimations of the usual seasonal letdown are beginning to make themselves felt. Sheet production has been scheduled through January and, in some cases, partly into February. Structural steel, both shapes and bars, is characterized by substantial bookings but little or no new business.

Reaffirmation of prices for first quarter had no effect on buying at St. Louis. Most users there are well protected on their requirements, what with material ordered for the present and next quarter shipment, and it is not believed there will be any buying until the latter part of January or the first part of February.

No settlement has yet been reached on the San Francisco water front tie-up and most shipments are being landed at Los Angeles and forwarded by rail. Substantial steel and cast iron pipe shipments have been routed in this manner at great additional expense, and most additional shipments from the East will be delayed when possible until the situation clears up. The State of California, through Governor Culbert L. Olson, has threatened to take over the port, a possibility distasteful to unions and shipping companies alike and a factor which may tend to speed up settlement. Dr. Louis L. Bloch is acting as mediator for the United States Department of Labor

The long awaited opening date for bids on the Pit River Bridge super-structure necessary for relocation of the Southern Pacific tracks and United States Highway 99 around Shasta Dam has been set for Jan. 16. Bureau of Reclamation lists the structure as containing 16,595 tons of fabricated structural shapes, 515 tons of cast

steel. Revised estimates indicate that two graving docks at Pearl Harbor, T. H., on which bids will be taken Dec. 20 will contain from 6000 to 10,000 tons of H-type bearing piles, 1600 tons of fabricated structural steel and 2500 tons of reinforcing steel, as well as a substantial tonnage of sheet piling, amount to be determined by the successful contractor's method of building.

PIG IRON

. . . First quarter orders booked at present prices

SELLERS at PITTSBURGH, CLEVE-LAND and other points are taking orders for first quarter shipment at fourth quarter prices, without formal price announcements. The Mystic Iron Works, Everett, Mass., on Dec. 1 reaffirmed prices for first quarter shipments, and New England foundries are melting at 75-80 per cent, a slight decline.

Shipments continue ahead of production in the CLEVELAND and YOUNGSTOWN areas while EASTERN PENNSYLVANIA finds deliveries absorbing all available ouput but expects December shipments to drop below November's with approach of the inventory season. Foundry operations in Philadelphia continue to expand and export inquiry there is very light. In the past week 6400 tons of African ore arrived at Boston.

Blast furnace operations at Birmingham continue at 100 per cent, a schedule unlikely to be changed soon. In Southern Ohio spot demand has tapered, while a slight easing in the stove and jobbers' melt has offset improvement in the automotive melt. Machine tool and railroad melters continue to be the most active.

The Jackson producer has raised the price of silvery iron \$1 a ton, effective at once.

WIRE PRODUCTS

... Wire prices unchanged for the first quarter

BASE prices on low carbon basic and bessemer wire are unchanged for shipment up to and including March 31, 1940, for delivery and consumption in the United States, according to announcements in the past week. The change whereby wire rods are now quoted on the net ton basis is discussed under the heading Semi-

Finished Steel in this issue. Wire production continues close to 90 per cent at CLEVELAND.

'Manufacturers' wire and wire rod backlogs at Pittsburgh are virtually unchanged from what they were a month ago. Demand is widely diversified and the clamor for deliveries has not subsided. Furthermore, a large percentage of first quarter capacity for these two products is already earmarked. Orders in the past week, if anything, were slightly in excess of the previous week. Merchant wire sales continue to level off and mills are making some headway in shipping unfilled tonnage.

CHICAGO wire sellers, now that first quarter prices are known, are taking business for that period. To date, little effort to secure business has been made so that most customers are not yet represented on first quarter books. In spite of this fact, the carry-over of tonnage promised for delivery this year will be quite small, and more than half the important CHICAGO consumers are still pressing for deliveries. It would appear from this information that these buyers are not concerned over the availability of steel in early 1940.

WAREHOUSE BUSINESS

. . . November sales generally larger than those of October

NOVEMBER sales from CHICAGO steel warehouses were about on a par with those of the previous month. This activity is expected to be maintained in December up to the holiday season. Orders throughout the month were well diversified. Warehouse officials believe that consumers' inventories are piling up very little.

Although there was a noticeable easing in demand in the warehouse sales in the Metropolitan New York-New Jersey area, sales in November were in very good volume. In many cases the month's sales were the highest on record, with alloy bar sales showing the largest relative gain. The demand for plates was the outstanding feature of the activity in the heavier products. With the reaffirmation of mill prices, sellers look for a more orderly market and some relaxation in delivery demands. However, the buying of material for a number of large public housing projects now developing, coupled with purchases by large consumers to supplement mill shipments, is expected to maintain sales at a high level for several months to come. Prices are very firm at the present and no change is expected until near the year end when revisions to aline warehouse quotations with the new mill prices on sheets and strips will be made.

A feature of November sales in the New York district was the heavy export demand, particularly from South America. Especial interest was shown by buyers below the equator for reinforcing bars and galvanized sheets. The volume of foreign sales was restricted somewhat by the lack of standardization in the sizes involved in many of the inquiries. The British Purchasing Commission has requested stock lists from several warehouses in the New York area and it is felt that the commission may be forced to turn to resale outlets for items where prompt shipment is imperative.

Warehouse sales in PHILADELPHIA have also tapered in the past 10 days, being currently at a level about 10 per cent below the high point of November. For November as a whole, bookings ranged from 5 to 20 per cent above October, with the heaviest call centering on merchant bars and sheets. Among the heavy products, plates were relatively the most active, due in a large measure to the demands of the railroads who were unable to obtain supplies from the mills quickly enough to support their rebuilding and repairing programs. There was a scattering of foreign inquiry during the month, but little actual business was transacted. No price changes were made during the month, but revisions on sheet and strip quotations are anticipated toward the end of the present month to compensate for the recent changes in mill prices on these items.

Warehouse business in St. Louis for November was slightly off as compared with October. Plates and merchant bars, principally for repair work, constituted the greater part of the business last month.

In Detroit, warehouse prices on all bands and hoops are now being quoted at 3.68c. per lb., base, removing the former difference in price whereby hot rolled strip under No. 12, and hot rolled strip, No. 12 and over, were quoted at different levels, the former being 3.68c. and the latter 3.46c. per base lb.

Buffalo warehouse sales experienced a slight drop in volume last month as compared with October.

All products are moving out of Boston warehouses in good volume, although business is not so good as it was a month ago. Warehouse stocks have been drawn down and some borrowing among firms has been necessary to fill certain orders.

Interest in warehouse products continues to be aggressive in the SOUTH-ERN OHIO district, with the current average being close to the year's peak. Building items are off a bit, but sheets, plates and bars continue to be noticeably active. Stocks are reported to be in good shape and prices are unchanged and firm.

BOLTS, NUTS AND RIVETS

. . . Producers giving consideration to first quarter prices

While the change in rod prices to the net ton basis, with rods up to 9/32 in. advancing \$1.60 per ton, might influence machine screw and stove bolt prices for first quarter, producers at CLEVELAND early this week were still giving consideration to the matter and not quite ready to announce.

Some cap screw manufacturers indicated they probably would absorb any difference. Rivet manufacturers apparently will go along for first quarter with prices unchanged.

SHEETS AND STRIP

. . . Commodity strip in coils takes higher extras . . . Hoops advanced

BASE prices on cold rolled strip and commodity strip for shipment up to and including March 31, 1940, for delivery and consumption in the United States, have been reaffirmed. In conformity with the new sheet price in coils, commodity strip extras on coiled material from 12 in. down to 2 in. inclusive, are up 10c. Coincident with the increase in hot rolled sheets and strip was a similar advance in the base price of tight cooperage hoops, which are now quoted at 2.20c, a lb. fo.b. Pittsburgh.

Sheet specifications at PITTSBURGH continue to roll in and at the beginning of this month the volume of unfilled tonnage was substantially unchanged from a month ago. Shipments are exceptionally heavy and mills have little room left on first quarter schedules. Demand continues to be widely diversified and although fresh business has been slipping within the past two weeks, the total volume of specifications has more than offset actual shipments.

New business has tapered at Cleve-LAND, but whether there is any connection with the reaffirmation of prices for first quarter is a question. Production and shipments continue heavy, Schedules indicate little slackening over the holidays in deliveries,

Ordering of sheets for first quarter delivery continues to be active, in the SOUTHERN OHIO district, although the aggressiveness of the demand has tapered somewhat. Consumers are now inquiring eagerly as to delivery dates. Deliveries are not being promised from that area much before the first week in February since order books have been virtually filled for January. On some items it is reported that delivery dates toward the end of February and the early part of March are the best than can be offered.

SHIPBUILDING

. . Only nine merchant boats to be ordered in 1940 . . . Navy asks bids

ALTHOUGH the Maritime Commission plans to order only nine ships during 1940—as contrasted with the 91 ships ordered this year—at least two of the vessels will be in the 30,000 tons class or similar to the passenger liner America but for use in trans-Pacific service. Invitations for bids will be issued in January. The remaining seven ships may include two additional passenger liners in the same category and five more vessels of a type yet to be determined.

The new passenger ships, like the *America* now under construction, and expected to be delivered to the United States Lines in the spring of 1940, will require approximately 13,800 tons of steel each.

During the last three months, while some Administration advisers were expressing concern over certain shipbuilders and tank manufacturers who would not be in the market for steel in the next 12 months because they had reportedly purchased a year's supply in advance, the Maritime Commission placed orders for 41 ships—a figure which brought the 1939 total to 91 ships.

Hence, the decision to order only nine ships next year cannot be interpreted as a slackening of pace due to restrictions imposed on American shipping under the neutrality law because 41 ships of next year's quota have already been contracted for.

The Navy Department will receive bids on Jan. 31, 1940, for the construction of one or two light cruisers of approximately 10,000 tons. The two ships were authorized under the 1940 replacement program and are the only two authorized to be started during the current fiscal year which have not already been contracted for. The original plans called for cruisers of 8000 tons displacement. Circulars for the information of bidders including plans and specifications will be available Dec. 15.

On the basis of previous estimates on ships in the so-called light cruiser category, the steel requirements for each will approximate 2680 tons of plain steel; 1200 tons of armor plate.

PLATES

... Adjustment of prices to 2.10c. level appears likely

ALTHOUGH plate mills which increased their prices \$5 a ton to a base of 2.35c. a lb. still feel the necessity of obtaining a price higher than the 2.10c. a lb. level that has been reaffirmed for the first quarter by the larger producers, they will probably endeavor to meet competition. The larger plate mills, which were pretty well sold out for the first quarter, will undoubtedly be able to offer better deliveries in the first quarter, which will be factor in any decision that the independent mills shall make regarding their quotations.

Plate demand in Eastern Pennsylvania continues at a moderate pace, with the independent mills offering delivery in two to three weeks and the larger producers in four to five weeks. New business in the past week was at a level slightly below output and the continuance of rolling operations at capacity is bringing a noticeable reduction in backlogs.

Railroad and miscellaneous demands probably are of the greatest current importance in Chicago. Some mills

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are booked into 1940 for 60 days but much of that tonnage is not urgent, so that delivery of 30 days can be obtained.

Several large orders last week boosted plate mill backlogs again at CLEVELAND after a lull of three weeks. The railroad equipment industry continues active.

SEMI-FINISHED STEEL

. . . Wire rods placed on net ton basis, increasing prices somewhat

HOT rolled wire rods, formerly priced per gross ton, have been placed on a net ton basis. Base prices at CLEVELAND, PITTSBURGH and CHICAGO, per 100 lb., are as follows, for shipment in the United States up to and including March 31, 1940:

No. 5-gage to 9/32 in. inclusive, \$2.00.

Over 9/32 in. to 47/64 in. inclusive, \$2.15.

On the Worcester base the above sizes are \$2.10 and \$2.25 respectively. Coarse rods are practically unchanged, but No. 5 gage to 9/32 in. are up 8c. per 100 lb.

With base prices put on the net ton basis, extras have been revised of necessity also. Quantity extras are as follows:

Items of 5 net tons or more of a size and grade, shipped in carloads.... Base Items of 5 net tons or more of a size and grade, shipped in less carloads.... \$0.10 Items of less than 5 net tons of a size and grade, shipped in carloads..... 0.10 Items of less than 5 net tons of a size and grade, shipped in carloads..... 0.20 grade, shipped in less carloads.... 0.20

Among other changes, in quality extras, which may be of interest are special welding quality cross chain round rods in coils, carbon up to 0.15 per cent maximum, which were \$15 per gross ton, now 65c. per 100 lb.

Quality extras on telephone quality EBB grade, which were \$20 per gross ton, are now 90c. per 100 lb., and BB grade, formerly \$12 per gross ton, are now 55c. per 100 lb. These extras include chemical compositions of all elements.

The conversion of wire rod prices, effective Jan. 1, 1940, to a net ton basis will reflect no change in the larger sizes but in the No. 5 to 9/32 in. gages, the adjustment will represent an increase of \$1.60 a ton on a net ton basis and \$1.80 a ton on a gross ton basis. Most consumers will undoubtedly order in net ton quantities rather than gross ton quantities as heretofore.

Backlogs of semi-finished steel at PITTSBURGH at the beginning of this month were substantially unchanged from a month ago. Incoming specifications are only held down by the inability of mills to accept some of the business being offered.

STRUCTURAL STEEL

. . . New projects total 33,340 tons, including 16,595 tons for bridge

STRUCTURAL steel lettings declined to 15,080 tons from 25,770 tons the previous week. Outstanding awards included 2550 tons for a high school in Forest Hills, N. Y., 1700 for another high school in Brooklyn, 1735 tons for a cellophane plant for the E. I. duPont de Nemours & Co. in Clinton, Iowa, and 1600 tons for the tower of the Naval Medical Center in Washington.

New structural projects increased sharply to 33,430 tons, from 12,855 tons last week. A bridge at Redding, Cal., calling for 16,595 tons, helped to swell the tonnage. Pearl Harbor, T. H., has called bids for 9600 tons for two graving docks, and a hangar

Weekly Bookings of Construction Steel

	Week Ended			Year to Date		
	Dec. 5, 1939	Nov. 28, 1939	Nov. 7, 1939	Dec. 6, 1938	1939	1938
Fabricated structural steel awards	15,080	25,770	20,550	40,710	915,875	859,575
Fabricated plate awards		2,310	3,150	9,225	177,350	128,810
Steel sheet piling awards			2,770	2,070	74,565	45,285
Reinforcing bar awards	3,720	2,380	5,115	11,150	439,515	324,810
Total Letting of Construction Steel	18,880	30,460	31,585	63,155	1,607,305	1,358,480

and technical school at Rantoul, Ill., for the War Department will call for 2200 tons.

Bids for furnishing, fabricating and erecting superstructure for the Pit River bridge required for the relocation of the Southern-Pacific tracks and United States Highway 99 around Shasta Dam have been set for Jan. 16 by the Bureau of Reclamation. Specifications list 16,595 tons of structural shapes and 515 tons of cast steel. Six thousand to 10,000 tons of H-type bearing piles and 1600 tons of fabricated structural shapes will be required for two graving docks at Pearl Harbor, T. H., on which bids will be taken Dec. 20.

The Chicago, Rock Island & Pacific Railway is reported to be considering the revival of a project to build a bridge across the Missouri River near Kansas City, Mo. It was first brought up in 1914, and, it is believed, will require between 3000 and 4000 tons of shapes.

TUBULAR GOODS

. . . Shipments at good rate but new buying slackens

RESH pipe business at PITTS-BURGH has slipped off some recently with the decline taking place mostly in oil-country goods specifications. Shipments against earlier commitments, however, remain at a high level. A further falling off in new orders from oil companies is expected in view of year-end influences.

At CLEVELAND and YOUNGSTOWN new business has slackened. Mills of both districts will run into December at high rates, but the buying lull will provide an opportunity for producers to get their neglected inventories in shape. Complications have been created frequently recently, by running too close to orders. Prices are unchanged.

REINFORCING STEEL

. . . Awards are light but new projects total 16,080 tons

NEW reinforcing steel awards were in low volume, amounting to only 3720 tons compared with 7590 tons last week. The largest award was for 1450 tons for work on the Panama Canal. The next largest item was for 900 tons for a Sears-Roebuck building in Los Angeles, the remainder of the projects calling for tonnages under 400 tons.

Inquiries totaled 16,080 tons and included 7500 tons for a filtration plant in Chicago and several in the 1000-ton class for road work in Pennsylvania and Illinois.

Activity is rather light, so much so in fact that some reports of price cutting \$3 a ton are being heard at CHICAGO.

As much as 2500 tons may be required for two graving docks at Pearl Harbor, T. H., on which bids will be taken Dec. 20. Reinforced concrete buildings at the Potrero housing project, San Francisco, will require approximately 1100 tons of bars.

TIN PLATE

. . . Mill backlogs substantial . . . Operations at 98%

T 1N plate operations this week are up one point to 98 per cent and, although the reaffirmation of present tin plate prices for first quarter shipment may relieve some of the tension, mill backlogs nevertheless remain substantial. The upsurge in general business conditions is directly influencing sales of goods packed in general line cans and, as a result, orders from this type of can makers are in fair volume. Export business represents a moderate proportion of current shipments.

RAILROAD BUYING

. . . Carriers now purchasing new motive power

CHIEF feature of the railroad market in the past week was again the buying of motive power equipment. The purchase of 27 locomotives were reported during the week, bringing the total for the past two weeks up to 35, as compared with 34 in the entire month of October. The Central of Georgia bought one dieselelectric switcher from Electro-Motive Corp.; Chicago, Rock Island & Pacific has placed five diesel-electrics with Davenport-Besler Corp. and five with Whitcomb Locomotive Corp.; Paulista Railway of Brazil has ordered four d.c. electric locomotives from General Electric Co.; Nevada Consolidated Copper Co. has purchased seven electric locomotives with General Electric Co., and Panama (Canal Zone) Railroad has ordered five diesel-electric locomotives, also from General Electric Co.

General American Transportation

Corp. has received authorization to build 50 additional tank cars by the fusion welding process. Magor Car Corp. has been awarded five tank cars by International Railways of Central America.

The rail mill of the Tennessee Coal, Iron & Railroad Co. resumed operations on Dec. 4, with indications that it would continue to operate until late spring.

MERCHANT BARS

. . . Some mills well sold through first quarter

DESPITE the high rate of finishing mill activity, hot rolled bar order backlogs at PITTSBURGH are slightly heavier today than they were a month ago, with delivery being promised far into the future on small bar and shape sizes especially. Demand is well diversified and reaffirmation of prices so far has not slowed up the volume of incoming specifications. Demand for more prompt delivery continues unabated.

Some CHICAGO producers are sold up on bars for the first quarter, with most of the other mills well into February. Inventories in consumers' plants are not considered high, and requests for prompter shipment continue to be frequent. Cold drawers and forgers, along with the farm equipment plants in the Middle West, are the big consumers in that territory.

Forward buying has hesitated at CLEVELAND during the past week, according to bar sellers who view the development as only natural after the reaffirmation of prices for first quarter. Heavy bar mills are scheduling in January and light mills into late February.

IRON ORE

. . . Season's movement on Lakes totals 45,066,175 tons

NOVEMBER shipments of 5,472,-605 gross tons, highest for the month since 1917, brought the vessel movement of Lake Superior iron ore for the season to 45,066,175 gross tons, an increase of 25,803,164 tons over the 19,263,011 tons shipped last season, according to the Lake Superior Iron Ore Association, Cleveland. The November, 1938, movement was only 1,481,305 tons.

. NON-FERROUS...

... Spelter prices cut \$10 a ton . . . Resale copper eases to 12.90 . . . First quarter tin quota set at 100 per cent.

sign of price weakness in the non-ferrous market since the buying wave of early fall, appeared late last week when resale copper for nearby delivery broke through the 13c., Connecticut Valley, level and sold for 12.90c. to 12.95c. This was followed on Monday by a \$10 cut in zinc prices by a leading custom smelter. Despite the weakness in the open market, primary copper producers continued to quote 12.50c., for electrolytic metal, delivered Connecti-

cut Valley, and fabricators raised prices ½c. a lb. on a number of brass and copper products. Buying of the red metal during the week showed no change from the low levels of past weeks, and there was little change in the tight position of prompt metal so far as the primary producers were concerned. The reduction in the open market price brought little response from consumers. Export demand for copper also fell off, and prices remained nominally in the neighborhood of 13c., f.a.s.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Nov. 29	Nov. 30	Dec. 1	Dec. 2	Dec. 4	Dec. 5
Copper, Electrolytic ¹	12.50	12.50	12.50	12.50	12.50	12.50
Copper, Lake	12.50	12.50	12.50	12.50	12.50	12.50
Tin, Straits, New York	54.00	53.00	52.50		52.25	52.00
Zinc, East St. Louis2	6.50	6.50	6.50	6.50	6.00	6.00
Lead, St. Louis ³	5.35	5.35	5.35	5.35	5.35	5.35

¹ Delivered Conn. Valley. Deduct ¼c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

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Cents per lb., Delivered

Ne	w York (Cleveland
Tin, Straits pig	53.50c.	Nominal
Copper, Lake		
Copper, electro	14.00c.	Nominal
Copper, castings		Nominal
*Copper sheets, hot-		
rolled	21.12c.	21.12c.
*Yellow brass sheets	19.31c.	19.31c.
*Seamless brass tubes	22.06c.	22.06c.
*Seamless copper tubes.	21.62c.	21.62c.
*Yellow brass rods		
Zinc slabs	7.875c.	8.125c.
Zinc sheets, No. 9 casks		
Lead, American pig	6.50c.	
Lead, bar	8.95c.	8.75c.
Lead, sheets, cut	8.50c.	8.50c,
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per		
cent plus	21.50c.	22.50c.
Alum., No. 1 remelt., 98		
to 99 per cent	19.00c.	19.50c.
Solder, 1/2 and 1/2		Nominal
Babbitt metal, commer-		
	Nominal	Nominal
cial grade	Nominal	Nomina

^{*}These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33%; on brass sheets and rods, 40; on brass tubes, 33%, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

Dealers'	Dealers'
Buying	Selling
Prices	Prices
10.25c.	10.875c.
9.25c.	9.625c.
8.25c.	8.75c.
5.50c.	6.00c.
4.625c.	5.375c.
9.25c.	10.125c.
5,25c.	5.75c.
9.125c.	9.625c.
4.50c.	4.875c.
9.25c.	10.25c.
15.25c.	16.25c.
3.625c.	4.875c.
	Buying Prices 10.25c. 9.25c. 8.25c. 5.50c. 4.625c. 9.25c. 9.25c. 15.25c. 15.25c. 15.25c. 15.25c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. Nickel, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. Antimony, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. Quicksilver, \$140 per flask of 76 lb. Brass Ingots, commercial 85-5-5, 13.75c. a lb.

Zinc

Culminating an extended period of dull demand, a leading custom smelter reduced quotations \$10 a ton on Monday to a basis of 6.39c. per lb., New York. This action, which caught most of the trade by surprise, has not yet been followed by all the other sellers. The reduction brought quotations down to the level prevailing for a short time in the second week of September, but prices are still 11/2c. per lb, above the quotation ruling through the first seven months of this year. The failure of all sellers to meet this new price was credited in part to the existence of the fairly heavy backlogs and the fact that the continued high rate of shipments indicates that consumpion is still on a high plane, with a large part of the first quarter's needs vet to be bought.

Lead

A steady demand, absorbing intake in most cases, persisted throughout the past week, with the buying fairly well divided between January and December. There still remains about 20 per cent of December's requirements to be covered, which the trade feels will assist in maintaining trading over the balance of the month at a fairly even pace. Shipments to consumers continue at a relatively high rate, but a tapering is looked for over the rest of the month as users go into the inventory-taking period. Quotations remain unchanged at 5.50c. per lb., New York.

Tin

Announcement in the past week by the International Tin Council that first quarter export quotas were set at 100 per cent of standard tonnages had little influence on market, as the present problem is not so much one of production as of obtaining from the Far Eastern producers a portion of the metal already produced. This is borne out by the November statistics which showed a decrease in stocks and tin afloat of 2958 tons and an increase of 2787 tons in the carryover at smelters in Europe and the East.

November Average Prices

The average prices of the major non-ferrous metals in November, based on quotations appearing in The Iron Age, were as follows:

	Per lb.
Electrolytic copper, Conn. Valley	12.50c.
Lake copper, Eastern delivery	
Straits tin, spot, New York	
Zine, East St. Louis	6.50c.
Zinc, New York	6.89c.
Lead, St. Louis	5.35c.
Lead, New York	5.59c.

IRON AND STEEL SCRAP

... Downward trend continues on light sales ... Composite declines 33c. to \$18.25.

EC. 5-No. 1 steel is quotably unchanged at Pittsburgh this week, but a small mill sale at Chicago has pushed down the whole market there 50c., and at Philadelphia mill sales at \$19 for No. 1 have warranted a 50c, decline in most steel making grades. As a result of these changes, THE IRON ACT composite has again declined, this one 33c, to \$1. I. Last week, the drop was \$1 lar y because of the extreme weakness at Pittsburgh, The drop from the high point of the average, \$22.50 registered on Oct. 3, is \$4.25 or 75 per cent of the gain made in the late September bull market.

Last week's weakness at Pittsburgh is being reflected elsewhere in dealer buying prices this week. At Detroit, the whole list is off \$1 to \$2. Bundles are particularly weak. Bundles also sold off at Philadelphia. Dealer prices at St. Louis are lower by 50c. to \$2, although 6000 tons of No. 2 steel was sold in line with last week's prices.

Export buying prices are softer, particularly at New York, in keeping with the domestic trend and the fact that there is hardly a vessel loading anywhere along the Atlantic coast.

Pittsburgh

The market is no stronger than a week ago and No. 1 heavy melting continues quotable at \$18.50 to \$19, as representing, for the time being at least, a cross-section of current factors. Some small sales have been made at around \$18.50, but brokers are finding it difficult to pick up much steel at this price. Further clarification is expected when the Pennsylvania list closes. Railroad heavy melting is quoted \$1 lower at \$19.50 to \$20 but may be changed further next week following other list closings.

Chicago

A small mill purchase of heavy melting steel at \$17 late last week has pushed this market down 50c. a ton to \$16.50 to \$17 for the prime steel grade. The entire list is lower in sympathy with this softer trend. In spite of 94 per cent mill operations in the Chicago district, it is believed that steel can be bought for less than \$17 at this writing. Brokers are paying \$16.50 and \$16.75 for steel from dealers.

Philadel phia

The downward trend in prices continued here in the past week, with mill sales of No. 1 being done at \$19 and No. 2 at \$17.75, a decline of 50c. in both cases from the previous week's levels.

Some of the cast grades and railroad items are also quotably lower this week. Supplies are still fairly plentiful. While there has not appeared as yet any signs of a reversal of the downward trend, most buyers feel that the bottom has probably been reached. One district consumer has purchased about 1000 tons of old trolley rails from the City of Easton, Pa., at \$16.80 per ton on cars. The November letting of Budd bundles, amounting to 5000 tons, went to a dealer at several dollars below the October price. A cargo of about 3000 tons was cleared for Japan last week. There is at present no buying for export in this district and prices are nominal.

Youngstown

Prices quoted by dealers seeking to interest mill buyers on 1000-ton lots at the start of this week indicate that present nominal published prices may be too low when finally tested. Dealers participating in recent sales in western Pennsylvania have paid as high as \$18.75 for single carloads of No. 1 heavy melting recently.

Cleveland

Except for necessary alinement here and there in specialty grades, quoted prices are unchanged here this week and remain purely nominal. Railroad lists this week will establish a better clue to actual conditions.

Buffalo

Although marked by no sales in this district at lower prices, the market this week fell off from \$1 to \$1.50 a ton sympathetically with other districts. In the absence of such sales No. 1 heavy melting is quoted at \$18 to \$18.50, the customary differential in No. 2 heavy melting, drop forge flashings, No. 1 busheling, and other allied grades prevailing.

St. Louis

An East Side mill bought 6000 tons of No. 2 heavy melting steel at the price prevailing which is unchanged, but other items are lower by from 50c. to \$2 a ton, as a result of a lack of buying and indications that mills will not reenter the market until after Jan. 1. The sale was made by four dealers, and is for delivery over the next 60 days, Railroad lists: New York, Chicago & St. Louis, 1000 tons; Wabash, 1800 tons; Chicago & Eastern Illinois, 200 tons, and Ann Arbor, 100 tons,

Cincinnati

The old materials market in the southern Ohio district is quiet. Virtually the entire list on dealers' bids have been reduced to adjust the market to reductions in other areas, but there has been relatively no purchasing to test current quotations. Consumers are wary over coverages and apparently are planning to stay out of the market until the trend of first quarter orders is definite.

Birmingham

A survey of the district disclosed no changes in the scrap market in this area. The recent large purchase of scrap announced in New York as being from European buyers has not been reflected here in any appreciable increase in demand and no price changes.

Detroit

Reductions up to \$2 a ton affecting the entire list of scrap grades have occurred in Detroit in the last week. Bundles slid off from an approximate \$17 top price to \$14.50, a figure ut which sales are known to have been made in the last week. As successive automotive lists closed, news of price reductions spread rapdly over the area and bids on each succeeding list were at lower levels. Scrap could be bought freely at the low prices early this week but the fact that no major list would again be out until mid-month-and that prices in this area have reached a level comparable to that of outside markets-is believed sufficient to maintain currently quoted prices pending some change in market conditions.

Boston

Further weakness has developed. About the only material that has not dropped in price is stove plate. Yard and export prices on heavy melting steel are off 50c. a ton, and the market is decidedly unsettled. Instead of stimulating business, lower prices have had just the opposite effect. Most brokers and exporters have withdrawn from the market. A boat is here loading 1000 tons of rails and 250 tons of car wheels for Consolidated Railroads of Cuba. No boats are loading at Providence and Portland. Michael Flynn, Inc., Brooklyn, has offered \$16,650 for the privilege of demolishing a Government plant at Squantum, Mass., and salvaging the steel. The tonnage involved is large.

New York

With the continued shortage of vessels for loading, buying prices for export have again been lowered by the principal brokers, this time \$1 to \$1.50. Since the placement of the new British business, the buying price of No. 1 steel has declined \$2.50 chiefly because of the large amount of material on barges, the tie-in of the sale with the composite domestic price of No. 1 steel, and the lack of bottoms. Prices for scrap on cars for domestic delivery have also declined 50c. to 75c. in sympathy with the trend in delivered prices at eastern Pennsylvania points.

Toronto

While Canadian scrap markets continued active during the week, softer prices developed in cast materials with both machinery cast and dealers cast marked down 50c. a ton. Stove plate has come into heavy demand recently with supplies limited. Low phos. steel has been added to the scrap list with dealers offering \$12 per gross ton for this material which has become very popular during the past couple of months. One of the largest contracts closed recently by a local dealer is for around 3500 tons of steel scrap for shipments to Sydney next spring.

PITTSBURGH

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Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.\$18.50 to \$19.00	
Railroad heavy melting 19.50 to 20.00	
No. 2 heavy melting 17.00 to 17.50	
Scrap rails 20.00 to 20.50	
Rails 3 ft. and under 22.50 to 23.00	
Comp. sheet steel 18.50 to 19.00	
Hand bundled sheets 17.50 to 18.00	
Heavy steel axle turn, 16.50 to 17.00	
Machine shop turnings 13.00 to 13.50	
Short shov. turnings 14.50 to 15.00	
Mixed bor. & turn 12.00 to 12.50	
Cast iron borings 12.00 to 12.50	
Cast iron carwheels 19.50 to 20.00	
Heavy breakable cast. 16.00 to 16.50	
No. 1 cupola cast 19.50 to 20.00	
RR. knuckles & coup., 24.00 to 24.50	
Rail coil springs 24.00 to 24.50	
Rail leaf springs 24.00 to 24.50	
Rolled steel wheels 24.00 to 24.50	
Low phos. billet crops, 25,00 to 25,50	
Low phos. punchings 23.50 to 24.00	
Low phos. heavy plate. 23,50 to 24.00	
Railroad malleable 21.50 to 22.00	

PHILADELPHIA

Per gro	ss ton	delivered	10	consumer	8
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rer gross ton delivered	to con	Bui	meri
No. 1 hvy. mltng. steel.	\$19.00	to	\$19.50
No. 2 hvy. mltng. steel.	17.50	to	18.00
Hydraulic bund., new.	19.00	to	19.50
Hydraulic bund., old	17.00	to	17.50
Steel rails for rolling	23.00		23.50
Cast iron carwheels	20.50	to	21.00
Hvy. breakable cast			19.00
No. 1 cast	20.50		21.00
Stove plate (steel wks)	16.00	to	16.50
Railroad malleable			22.00
Machine shop turn	13,00		13.50
No. 1 blast furnace			12.50
Cast borings	13.50		14.60
Heavy axle turnings	15.50		16.00
No. 1 low phos. hvy	24.00		25.90
Couplers & knuckles	23.50		24.50
Rolled steel wheels	23.50		24.50
Steel axles	24.50		25.00
Shafting	24.50		25.00
Spec. iron & steel pipe			18.00
	16.50		17.00
Cast borings (chem.)	14.00	CO	14.50

CHICAGO

Delivered to Chicago district consumers:

n 0	
Per Gross	Ton
Hvy. mltng. steel 16.50 to	17.00
Auto, hvy, mltng, steel	
	16.00
No. 2 auto steel 12.50 to	13.00
	17.00
Factory bundles 16.00 to	16.50
Dealers' bundles 14.50 to	15.00
	16.00
No. 2 busheling, old 6.50 to	7.00
	20.00
Railroad tires, cut 19.75 to	20.25
Railroad leaf springs 19.00 to	19.50
Steel coup. & knuckles. 19.00 to	19.50
	16.00
Coil springs 20.00 to	20.50
	18.00
	21.00
Low phos. plates 12 in.	
	20.50
Cast iron borings 9.00 to	9.50
	11.00
Machine shop turn 9.00 to	9.50
	20.00
	20.00
	20.50
	19.00
	16.25
	19.50
	15.50
Per Net	
Iron car axles 22.25 to	22.75
Steel car axles 20.50 to	21.00

Locomotive tires	15.50 to	16.00
Pipes and flues	12.00 to	12.50
No. 1 machinery cast	14.25 to	14.75
Clean auto, cast	14.50 to	15.00
No. 1 railroad cast		
No. 1 agric. cast,	12.00 to	12,50
Stove plate	10.50 to	11.00
Grate bars	10,50 to	11.00
Brake shoes	12.00 to	12.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng, steel.	\$18.50	to	\$19.00
No. 2 hvy. mltng. steel.	17.50	to	18.00
Low phos. plate	23.50	to	24.00
No. 1 busheling	17.75	to	18.25
Hydraulic bundles			
Machine shop turn	12.50	to	13.00

Iron and Steel Scrap Prices

CLEVELAND

Per gross ton delivered to consu	mer:
No. 1 hvy. mltng. steel.\$18.00 to	\$18.50
No. 2 hvy. mltng. steel. 17.00 to	17.50
Comp. sheet steel 17.75 to	18.25
Light bund. stampings 15.50 to	16.00
Drop forge flashings 17.00 to	17.50
Machine shop turn 12.00 to	12.50
Short shov. turn 12.75 to	13.25
No. 1 busheling 17.25 to	17.75
Steel axle turnings 17.00 to	17.50
Low phos. billet and	
bloom crops 24.00 to	24.50
Cast iron borings 12.50 to	13.00
Mixed bor. & turn 12.50 to	13.00
No. 2 busheling 12.50 to	13.00
No. 1 cupola cast 20.00 to	20.50
Railroad grate bars 14.50 to	15.00
Stove plate 14.50 to	15.00
Rails under 3 ft 23.00 to	23.50
Rails for rolling 21.75 to	22.00
Railroad malleable 21.00 to	21.50

BUFFALO

Per gross ton delivered	to consu	mer:
No. 1 hvy. mltng. steel.	\$18.00 to	\$18.50
No. 2 hvy. mltng. steel.	16.00 to	16.50
Scrap rails	18.50 to	19.00
New hvy, b'ndled sheets	16,00 to	16.50
Old hydraul, bundles	15.00 to	15,50
Drop forge flashings	16,00 to	16.50
No. 1 bushelings	16.00 to	16.50
Machine shop turn	10.00 to	10.50
Shov. turnings	12.50 to	13.00
Mixed bor. & turn	11.00 to	11.50
Cast iron borings	11.00 to	11.50
Knuckles & couplers	22.00 to	23.00
Coll & leaf springs	22.00 to	23.00
Rolled steel wheels	22,00 to	23,00
No. 1 machinery cast	18.00 to	18.50
No. 1 cupola cast	17.00 to	17.50
Stove plate	14.50 to	15,00
Steel rails under 3 ft	22,00 to	22.50
Cast iron carwheels	18,50 to	19.00
Railroad malleable	19.50 to	20.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

delivered to cons	mmer:	
Selected hvy. melting		\$17.00
No. 2 hvy. melting	15.00 to	
No. 1 locomotive tires.		
Misc. stand. sec. rails.	17.00 to	
Railroad springs	19.00 to	
Bundled sheets	10.50 to	
No. 1 busheling	14.00 to	
Cast bor, & turn	6.00 to	
Machine shop turn	7.00 to	
Heavy turnings	11.50 to	
Rails for rolling	20.00 to	
Steel car axles	19.50 to	
No. 1 RR. wrought	11.50 to	
No. 2 RR. wrought	15.00 to	
Steel rails under 3 ft	20.50 to	
Steel angle bars	17.50 to	
Cast iron carwheels	19.00 to	
No. 1 machinery cast	18.00 to	
Railroad malleable	17.50 to	
No. 1 railroad cast	16.00 to	
Stove plate	11.00 to	
Grate bars	10.50 to	
Brake shoes	12.00 to	12.50

CINCINNATI

Dealers' buying prices per gross ton

at yards:		
No. 1 hvy. mltng. steel.	\$14.00 to	\$14.50
No. 2 hvy. mltng. steel.	12.00 to	12.50
Scrap rails for mltng	18.00 to	18.50
Loose sheet clippings.	9.50 to	10.00
Hydrau, b'ndled sheets	13.50 to	14.00
Cast iron borings	5.00 to	5.50
Machine shop turn	6.00 to	6.50
No. 1 busheling	10.50 to	11.00
No. 2 busheling	4.00 to	4.50
Rails for rolling	19.50 to	20.00
No. 1 locomotive tires.	15.50 to	16.00
Short rails	21.00 to	21.50
Cast iron carwheels	16.00 to	16.50
No. 1 machinery cast	17.50 to	18.00
No. 1 railroad cast	15.50 to	16.00
Burnt cast	9.00 to	9.50
Stove plate	9.00 to	9.50
Agricul, malleable	14.00 to	14.50
Railroad malleable	17.00 to	17.50
Mixed hvy. cast	15.00 to	15.50

BIRMINGHAM

Per gross ton delivered to consum	
Hvy. melting steel	\$17.00
Scrap steel rails	19.00
Short shov, turnings	9.00
Stove plate\$10.50 to	
Steel axles	21.00
Iron axles	21.00
No. 1 RR. wrought	
Rails for rolling 21.00 to	22.00
No. 1 cast	17.00
Tramcar wheels	17.00
DETROIT	

Dealers' buying prices p	er gro	68	ton:
No. 1 hvy. mltng. in-			
dustrial steel	\$14.00	to	\$14.50
No. 2 hvy. mltng. steel.	12.50	03	13.00
Borings and turnings	7.00	to	7.50
Long turnings	5.50	to	6.30
Short shov, turnings	8.50	to	9.00
No. 1 machinery cast	13.50	to	14.00
Automotive cast	15.00	to	15.50
Hvy. breakable cast	10.50	to	11.90
Stove plate	9.00	to	9.50
Hydraul. comp. sheets.	14.25	to	14.75
New factory bushel	12.50	to	13.00
Sheet clippings			
Flashings	12.25	to	12.75
Low phos. plate scrap.			

NEW YORK

months weak well Burner &	and the same	
on cars:		
No. 1 hvy. mltng. steel.	\$15.00 to	\$15.50
No. 2 hvy, mltng, steel.	13.00 to	13.50
Hvy. breakable cast		
No. 1 machinery cast	16.50 to	17,00
No. 2 cast	13.50 to	14.00
Stove plate	12.00 to	12,50
Steel car axles	19.00 to	20.00
Shafting	19.00 to	20.00
No. 1 RR. wrought	14.00 to	15.00
No. 1 wrought long	12.50 to	13.00
Spec. iron & steel pipe	13,50 to	14.00
Rails for rolling	19.00 to	20.00
Clean steel turnings*.	9.00 to	
Cast borings*	8.00 to	9.00
No. 1 blast furnace	8.00 to	9.00
Cast borings (chem.)	No	minal
Unprepared yard scrap	9.00 to	9.50
Light iron	5.00 to	
Per gross ton, delivererd l	ocal four	ndries:
No. 1 machin. cast	\$20.00 to	\$22.00
No. 2 cast	18.50 to	19.00
-		

* \$1.50 less for truck loads.

BOSTON	
Dealers' buying prices per gross	lon
Breakable cast\$13.25 to	\$13.50
Machine shop turn 7.00 to	7,25
Mixed bor. & turn 6.25 to	6,50
Bun, skeleton long 10.50 to	10,75
Shafting 18.25 to	18.50
Stove plate	11.00
Cast bor. chemical 9.50 to	9.75
Per gross ton delivered consumers'	yards
Textile cast\$17.00 to	\$18.00
No. 1 machine cast 17.00 to	18.00
Per gross ton delivered dealers' ya	redes
No. 1 hvy. mltng. steel	\$14.50
No. 2 steel	13.50

Toro	onto Mo	ontreal
Low phos. steel	12.00	\$11.50
No. 1 hvy. mltng. steel.	11.25	10.75
No. 2 hyv. mltng, steel,	10.00	9.50
Mixed dealers steel	9.25	8.75
Drop forge flashings	10.25	9.75
New loose clippings	7.00	6.00
Busheling	5.50	5.00
Scrap pipe	8.00	7.50
Steel turnings	6.25	5.75
Cast borings	5.75	5.25
Machinery cast	17.50	17.00
Dealers cast	16.50	16.00
Stove plate	12.00	11.50
EXPORT		
Darland harden nelses no		fom t

Besiers, pulling brices her gross rout.
New York, truck lats, delivered, harges
No. 1 hvy. mltng. steel.\$14.50 to \$15.00
No. 2 hyv. mltng. steel, 13,00 to 13,50
No. 2 cast
Stove plate 10.50 to 11.00
Boston on cars at Army Base

\$16.50
15.50
16.50
\$12.50
boots,
ominal
ominal

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL Billets, Blooms and Slabs Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only,	Philadelphia, del'd2.15c, to 2.40c, New York, del'd2.29c, to 2.54c. On cars dock Gulf ports2.45c. On cars dock Pacific ports2.60c, Wrought iron plates, P'tg3.80c.	Electrical 4.05c. Motor 4.95c. Dynamo 5.65c. Transformer 72 6.15c. Transformer 65 7.15c. Transformer 58 7.65c. Transformer 52 8.45c.
\$2 higher. Per Gross Ton Rerolling \$34.00 Forging quality 40.00 Sheet Bars	Pittsburgh or Chicago 3.35c. New York, del'd 3.71c. On cars dock Gulf ports 3.70c. On cars dock Pacific ports 3.95c.	Silicon Strip in coils—Sheet price plus sili- con sheet catra width eatra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb. Long Ternes No. 24 unassorted 8-lb. coating
Pittsburgh, Chicago Cleveland, Youngstown, Buffalo, Conton, Spar- ows Pint, Md.	STRUCTURAL SHAPES Base per Lb. Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birming-	f.o.b. Pittsburgh or Gary 3.80c. F.o.b. cars dock Pacific ports. 4.50c. Vitreous Enameling Stock, 20 Gage* Pittsburgh, Chicago, Gary, Youngstown, Middletown or
Skelp Pittshurgh, Chicago, Youngstown, Coatesvile, Fa., Sparrows Point, Md.	ham 2.10c. Philadelphia, del'd 2.215c. New York, del'd 2.27c. On cars dock Gulf ports 2.45c. On cars dock Pacific ports 2.70c.	Cleveland 3.5c. Detroit, delv'd 3.45c. Granite City 3.45c. On cars dock Pacific ports. 3.95c.
Grooved, universal and	STEEL SHEET PILING	TIN MILL PROPULCTS
sheared1.90c.	Base per Lb. Pittsburgh, Chicago or Buffalo 2.40c.	TIN MILL PRODUCTS *Tin Plate
Wire Rods (No. 5 to 9/32 in.) Per Net Ton	On cars dock Gulf ports 2.85c. On cars dock Pacific ports 2.90c.	Per Base Box Standard cokes, Pittsburgh, Chicago and Gary
Pittsburgh or Cleveland \$40.00 Worcester, Mass. 42.90 Birmingham 40.00 San Francisco 48.00	RAILS AND TRACK SUPPLIES F.o.b. Mill Standard rails, heavier than 60 lb., per gross ton\$40.00	 Prices affective Nov. 10 on shipments through first quarter of 1939. Special Coated Manufacturing Ternes
Galveston	Angle bars, per 100 lb 2.70 F.o.b. Basing Points	Granite City
SOFT STEEL BARS	Light rails (from billets) per gross ton\$40.00	Roofing Terne Plate
Base per Lb. Pittsburgh, Chicago, Gary,	Light rails (from rail steel) per gross ton	(F.o.b. Pittsburgh per Package, 112 sheets) 20x14 in. 20x28 in.
Cleveland, Buffalo and Birmingham 2.15c.	Cut spikes 3.00c.	8-lb. coating I.C. \$6.00 \$12.00 15-lb. coating I.C. 7.00 14.00
Detroit, delivered 2.25c. Duluth 2.25c.	Screw spikes 4.55c.	20-lb, coating I.C. 7.50 15.00 25-lb, coating I.C. 8.00 16.00
Philadelphia, delivered 2.47c.	Tie plates, steel 2.15c. Tie plates, Pacific Coast ports. 2.25c.	30-lb. coating I.C. 8.63 17.25
New York	Track bolts, to steam railroads 4.15c. Track bolts to jobbers, all sizes	40-lb. coating I.C. 9.75 19.50 Black Plate, 29 gage and lighter
	(per 100 counts)	Pittsburgh, Chicago and Gary 3.05c. Granite City 3.15c.
(For merchant trade)	Chicago and Birmingham; on spikes and the plates, Pittsburgh, Chicago, Portsmouth, Ohio,	On cars dock Pacific ports, boxed 4.00c.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birming-	Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.,	
ham	Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.	HOT ROLLED STRIP
On cars dock Pacific ports 2.75c.	*	(Widths up to 12 in.) Base per Lb.
BILLET STEEL REINFORCING BARS	SHEETS Hot Rolled	Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.10c.
(Straight lengths as quoted by distributers)	Pittsburgh, Gary, Birming-	Detroit, delivered 2.20c.
Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleve-	ham, Buffalo, Sparrows Point, Cleveland, Youngstown, Mid-	On cars dock Pacific ports 2.70c. Cooperage Stock
land, Youngstown or Spar- rows Pt 2.15c.	dletown or Chicago 2.10c. Detroit, delivered 2.20c.	Pittsburgh & Chicago 2.20c.
Detroit, delivered 2.25c.	Philadelphia, delivered 2.27c. Granite City 2.20c.	From May 10 up to and including May 15, reductions in the base price of hot rolled stragrunning from \$4 to \$8 a ton were prevalent. Concessions withdrawn on May 15.
On cars dock Tex. Gulf ports 2.50c. On cars dock Pacific ports 2.50c.	On cars dock Pacific ports 2.60c. Wrought iron, Pittsburgh 4.10c.	Concessions withdrawn on May 15. Subsequent to May 15, many orders originally
RAIL STEEL REINFORCING BARS	Cold Rolled* Pittsburgh, Gary, Buffalo,	placed at \$4 to \$6 below the base price were sd- justed to the full \$8 concession.
(Straight lengths as quoted by distributers)	Youngstown, Cleveland, Mid- dletown or Chicago 3.05c.	COLD ROLLED STRIP*
Pittsburgh, Chicago, Gary, Buf- falo, Cleveland, Youngstown	Detroit, delivered 3.15c.	Base per Lb. Pittsburgh, Youngstown or
or Birmingham 2.15c. Detroit, delivered 2.25c.	Granite City	Cleveland 2.80c. Chicago 2.90c.
On cars dock Tex. Gulf ports 2.50c. On cars dock Pacific ports 2.50c.	* Mill run sheets are 10c, per 100 lb, less than	Detroit, delivered 2.90c. Worcester 3.00c.
IRON BARS	From May 10 up to and including May 15	* Carbon 0.25 and less.
Chicago and Terre Haute 2.15c.	ductions from the base price of hot and cold rolled sheets running from \$4 to \$8 a ton were prevalent. Concessions withdrawn, on May 15.	Commodity Cold Rolled Strip
Pittsburgh (refined) 3.60c. COLD FINISHED BARS AND	Subsequent to May 15, many orders originally placed at \$4 to \$6 below the base price were ad-	Pittsburgh, Youngstown, or Cleveland 2.95c.
SHAFTING*	justed to the full \$8 concession. Galvanized Sheets, 24 Gage	Detroit, delivered 3.05c. Worcester 3.35c.
Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.	Pittsburgh, Chicago, Garv.	From May 10 up to and including May 15, reductions from the base price of cold rolled strip
Detroit 2.70c.	Sparrows Point, Buffalo, Middletown, Youngstown or	amounting to \$4 a ton were prevalent. Cen- eessions withdrawn on May 15.
* In quantities of 20,000 to 39,989 lb.	Philadelphia delv'd 3.50c.	
PLATES	On cars dock Pacific ports 4.00c.	COLD ROLLED SPRING STEEL Pittsburgh
Pittsburgh, Chicago, Gary,	Wrought iron, Pittsburgh 6.10c.	and Cleveland Worcester
Birmingham, Sparrows Point, Cleveland, Youngstown	(F.o.b. Pittsburgh)	Carbon 0.26-0.50% 2.80c. 3.00c. Carbon 0.51-0.75 4.30c. 4.59c.
Coatesville, Claymont, Del	Field grade	Carbon 0.76-1.00 6.15c. 6.35c.
200.	3.05c.	Carbon 1.01-1.25 8.35c. 8.55c.

WIDE BRODUCTS

	AARIA	E LIGH	200013
			Pittsburgh, Chi-
cago, Cle	velan	d and	Birmingham)
To	Man	ufacti	ring Trade

		an any a	 	2100	Per Lb.
Bright	wire		 		2.60c.
					2.65c.*
Spring	wire		 		3.20c.

On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

tive. o to a gage, metastro, thus being o.zoc.
To the Trade
Base per Keg
Standard wire nails\$2.55
Coated nails 2.55
Cut nails, carloads 3.70
Base per 100 Lb.
Annealed fence wire\$2.90
Galvanized fence wire 3.30
Twisted barbless wire 3.40
Woven wire fence, No. 11 and
heavier, base col 70
Woven wire fence, lighter than
No. 11, base col 67
Single loop bale ties, base col 56
Stand. 2 pt., 12.5 gage barbed
cattle wire, per 80 rod spool\$2.70
Stand. 2 pt., 12.5 gage barbed
hog wire, per 80 rod spool\$2.88
Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills F.o.b. Pittsburgh only on wrought iron pipe.

Butt	Weld
Steel	Wrought Iron
In. Black Galv.	In. Black Galv.
1/856 36	148% .+9 +30
1/4 to %.59 431/2	1/224 61/2
1/2631/2 54	%30 13
%66 1/2 60 1/2	1 & 1%.34 19
1 to 368½ 60½	2 3714 21
	231/2 21

			Lap	Weld	
2		61	521/4	12301/2	15
24	6 &	364	551/2	21/2 to 31/4 311/4	174
81	& to	6.66	571/2	4331/2	21
7	&	8.65	551/2	41/2 to 8.321/2	20
9	38	10.641/2	55	9 to 12281/2	15
11	38	12.63 1/2	54		

Butt weld, e	xtra	strong,	plain	ends
1/854 1/2	411/4	14.8 %	+10	+43
1/2 to 3/8 .56 1/2	451/4		25	9
1/261 1/2	371/4		31	15
3/465 1/2	571/4		38	221/2

Lap weld, extra	strong, plain ends
	233½ 18½ 2½ to 4.39½ 25½ 4½ to 6.37½ 24
	7 & 838½ 24½ 9 to 1232 20½

Or but weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount of \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld \$1 in. and smaller.

Boiler Tubes

Scamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	See	mless	Lap
	Cold	Hot	Hot
	Drawn	Rolled	Rolled
1 in. o.d13 B.W.G.	\$ 9.01	\$ 7.82	****
1% in. o.d13 B.W.G.	10.67	9.26	
1 1/4 in. o.d13 B.W.G. 1 1/4 in. o.d13 B.W.G.	11.70	10,23	\$9.72
1% in. o.d13 B.W.G.	13.42	11.64	11.06
1 in. o.d13 B.W.G.	15.03	13.04	12.38
21/4 in. o.d13 B.W.G.	16.76	14.54	13.79
21/4 in. o.d12 B.W.G.		16.01	15.16
21/2 in. o.d12 B.W.G.	20.21	17.54	16.58
2% in. o.d12 B.W.G.	21.42	18.59	17.54
3 in. o.d12 B.W.G.	22.48	19.50	18.35
31/2 in. o.d11 B.W.G.	28.37	24.62	23.15
4 in. o.d10 B.W.G.	35.20	30.54	28.66
41/2 in. o.d10 B.W.G.		37.35	35.22
5 in. e.d 9 B.W.G.	54.01	46.87	44.25
6 in. o.d 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000	lb.	or	ft.	01	rer									. Base
30,000														
20,000														
					19,999									
					9,999									
2,000	lb.	OF	ft.	to	4,999	lb.	or	ft.						45%
Under	2.00	00	lb.	OF	ft				 æ	2 1	. 6	20	8	65%

CAST IRON WATER PIPE

Per N	et Ton
*6-in. and larger, del'd Chicago	
6-in, and larger, del'd New York	k 52.20
*6-in. and larger, Birmingham	
6-in. an dlarger, f.o.b. dock, Sar	
Francisco or Los Angeles	. 52.00
F.o.b. dock, Seattle	. 52.00
4-in. f.o.b. dock. San Francisco	0
or Los Angeles	
F.o.b. dock, Seattle	. 52.00

Class "A" and gas pipe, \$3 extra 4-in, pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45, Birmingham, and \$53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago) Per Cent Off List

Machine and carriage bolts: 1/2 in, and 6 in, and smaller685	4
Larger and longer up to 1 in 66	
1% in. and larger 64	
Lag bolts 66	
Plow bolts, Nos. 1, 2, 3,	ı
and 7683	b
Hot pressed nuts, and c.p.c.	
and t-nuts, square or hex.	
blank or tapped:	
1/2 in. and smaller 67	
9/16 in. to 1 in inclusive 64	
1% in. and larger 62	
4.78 III. GEIGG 1018-01	

On the above items with the exception of plow boits, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin, hexagon nuts	U.S.S.	
½ in. and smaller 9/16 to 1 in	67 64	70 65
1% in. and larger		62
In full container lots additional discount.	, 10 pe	er cent

Stove	bolts	in	packages,	with	
nuts	holts	in	packages,	with	721/2
nuts	attacl	hed.	add 15%	extra.	091/
			teht is allowed		

On store belts reight is allowed up to eoc. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets

1/2 222	Base per 100 Lb.
	Cleveland, ham\$3.40

Small Rivets

(7/16 in. and smaller) Per Cent Off List F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ...65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

2 0. 00111 011 23	-
Milled hexagon head, cap screws, 1 in. dia. and smaller50 and	
Milled headless set screws, cut thread ¼ in. and larger 3/16 in. and smaller	64
Upset hex. head cap screws U.S.S. or S.A.E, thread 1 in. and	
smaller	70
points Milled studs	75 52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo,
Bethlehem, Massillon or Canton.
Open-hearth grade, base2.70c.
Open-hearth grade, base
Delivered, Detroit2.80c.
S.A.E. Alloy
Numbers per 100 Lb.
200 (1/4 % Nickel)
200 (%% NICKel)

2100 (11/2% Nickel)	80.Th
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
31 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3,80
3400 Nickel-chromium	3,20
4100 Chromium-molybdenum	
(0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum	
(0.25 to 0.40 Molybdenum)	0.75
4340 ChrNiMo	1.65
4345 ChroNiMo	1.85
4600 Nickel - molybdenum (0.20	
to 0.30 Mo. 1.50 to 2.00 Nl.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium spring steel	0.15
\$100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium	
spring steel	
Chromium-nickel vanadium	
Carbon-vanadium	0.85
These prices are for hot-rolled steel bars, differential for most grades in electric ft steel is 50c. higher. Slabs with a section of 16 in, and 2½ in, thick or over take the base.	APRA A
Allan Cold Pinished Bare	

Alloy Cold-Finished Bars
F.o.b. Pittsburgh, Chicago, Gary,
Cleveland or Buffalo, 3.35c. base per
lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel	
No. 304	No. 302
Forging billets 21.25c.	20.40c.
Bars 25c.	24c.
Plates 29c.	27c.
Structural shapes 25c.	240.
Sheets 36c.	34c,
Hot-rolled strip 23.50c.	21.50c.
Coled-rolled strip 30c.	28c.
Drawn wire 25c.	24c,

Straight Chrome

	410	430	442	446
Bars	18.50c.	19c.	22,50c.	27.50c.
Plates			25.50c.	30.50c.
Sheets			32.50c.	36.50c,
Hot sty			24c.	350,
Cold st	p. 22c.	22.50c.	32c.	52c.

TOOL STEEL

High sp High-ca																						
Oil-hard																						
Special		2	8					*	×	8		8	10	*	8	8	8	×	10	10	8	2
Extra		0	0	0	0	0	0		0	0	0			0		0			0			1
Regular	0																					1

Prices for warehouse distribution to all points on or East of Mississippi River are 2c, a lb, higher. West of Mississippi quotations are 3c, a lb, higher.

British and Continental

BRITISH

Per Gross Ton f.o.b. United Kingdom Ports

Ferromanganese, ex-	. Nominal
Tin plate, per base	
box	31s. 6d.
Steel bars, open hearth. 12 £	
Beams, open hearth11 &	
Channels, open hearth11 &	
Angles, open hearth11£	2s. 6d.*
Black sheets, No. 24	
gage	6d. max.*
Galvanized sheets, No. 24	
gage	6d. max.*

^{*} Empire markets only.

CONTINENTAL

Per Gross Ton. Gold £, f.o.b. Continental Ports

Billets, ThomasN	ami	mai
Wire rods, No. 5 B.W.G £5 1		
Steel bars, merchants£5	58.	
Sheet BarsN	omi	na!
Plate % in, and up£5	78.	
Plate 3/16 in. and 5 mm £5 1	38.	
Sheet 1/4 in£5		6d.
Beams, Thomas£4 1		
Angles (Basic)£4 1	8s.	
Hoops and strip, base £5 1	28.	

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Spar-	\$24.00
rows Point, Md	24.00
Delivered Brooklyn Delivered Newark or Jersey	26.50
City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City,	00.00
Cleveland and Youngstown F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati.	23.06
Northern, delivered, Cincinnati F.o.b. Duluth	
F.o.b. Provo, Utah	
fellvered, San Francisco, Los	96 50
Birmingham*	19.38
-b1	

ivered prices on southern from for ship-o northern points are 38c. a ton below red prices from nearest northern basing a on iron with ph sphorus content of 0.70 per and over.

Malleable

Base prices on malleable iron are 50c, a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Eisewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass F.o.b. Bethlehem, Birdsbor	ro,
Swedeland and Steelton, P.	
and Sparrows Point, Md	
F.o.b. Neville Island, Erie, P.	a.,
Toledo, Chicago, Granite Cit	У.
Cleveland and Youngstown. Delivered Philadelphia	
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	\$24.00
F.o.b. Everett, Mass F.o.b. Bethlehem, Birdsboro and	25.00
Swedeland, Pa	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth F.o.b. Neville Island, Toledo.	24.00
Chicago and Youngstown F.o.b. Birmingham	23.50
Delivered Cincinnati	24.11
Delivered Canton, Ohio Delivered Mansfield, Ohio	24.89 25.44

Low Phosphorus

Basing points:	Birdsboro, Pa.,
Steelton, Pa.,	and Buffalo \$28.50

Gray Forge

Valley or Pittsburgh furnace. \$22.50

Charcoal

Lake	Sup	erior	furn	ac	е				 \$27.	00
Deliv	ered	Chic	ago			0	 		 . 30.	34

Canadian Pig Iron

Per Gross Ton

									À	Ľλ	U	P.A.	2, 5	ıÆ	10	24	u	ļ.				
Found	r	y		î	r	0	n				,			*	8	8	*		*	*	\$27.50	
Mallea	b	ı	e			*		*	*	×			*		*			*			28.00	
Basic	*	*			*	*	*		*		*			×	ú		×	*	*		27.50	base

					٠,	ľ,	0	r	O	T	ţ	C	,			
Foundry	iı)1	n	0					D			6	0	\$25.50	
Malleabl																
Basic		*									*				25.50	base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b.	New	York,	Philadelphia,
Baltimore	Mot		ew Orleans.
		1	Per Gross Ton)\$100.90

Spiegeleisen

		P	er Gi	00	0.8	8	2	10	01	18	1	F	urnace
Domestic,	19	to	21%.										.\$32.00

Electric Ferrosilicon

Per Gross Ton Delivered;
Lump Size

50% (carload lots, bulk)\$69.50*

50% (ton lots in 50 gal. bbl) .. 80.50*

75% (carload lots, bulk)126.00*

75% (ton lots in 50 gal. bbl.) .. 139.00*

Bessemer Ferrosilicon

APPOINTED A TATABOUTE
F.o.b. Furnace, Jackson, Ohio Per Gross Ton
10.00 to 10.50%\$32.50
For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.
For each unit of manganese over 2%, \$1 per ton additional.
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Per Gross Ton
F.o.b. Jackson, Ohio, 5.00 to 5.50%\$27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton. The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.
¥3 1

Silvery Iron

Ferrochrome

A CAR O'CHE CHIC
Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract
4 to 6% carbon
2% carbon
C.10% carbon19.50c.
0.06% carbon20.00c.

Silico-Manganese

	Size,									
										.\$98.00
2.50%										
										.108.00
1% ca	rbon .	 					*	*		.118.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads \$2	.00
Ferrotungsten, 100 lbs. and less 2 Ferrovanadium, contract, per lb. contained V., deliv-	.25
ered\$2.70 to \$2	.90†
Ferrocolumbium, per lb. con- tained columbium, f.o.b. Ni-	
	.25†
Ferrocarbontitanium, 15 to	
18% Ti, 7 to 8% C, f.o.b. fur-	
nace carload and contract	
per net ton\$142	.50
Ferrocarbontitanium, 17 to	
20% Ti, 3 to 5% C, f.o.b. fur-	
nace, carload and contract.	
per net ton\$157	.50
Ferrophosphorus, electric, or	
blast furnace material, in	
carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unit-	
age, freight equalized with	
Rockdale, Tenn., per gross	
ton \$58	5.50
Ferrophosphorus, electrolytic	
23-26% in car lots, f.o.b.	
Monsanto (Siglo), Tenn.	

24%, per gross ton, \$3 unit-	
age, freight equalized with	
Nashville	\$75.0
ferromolybdenum, per lb. Mo.	950
Calcium molybdate, per lb.	
No. f.o.b. furnace	80c.

Molybdenum oxide briquettes	
48-52% Mo; per lb. con- tained Mo. f.o.b. Langeloth,	
Pa	8

* Spot prices are \$5 per ton higher, † Spot prices are 10c, per lb. of con-tained element higher.

*ORES

Lake Superior Ores
Delivered Lower Lake Ports

201101101 201001 20110 20110
Per Gross Ton
Old range, Bessemer, 51.50%\$5.25 Old range, non-Bessemer, 51.50% 5.10 Messabi, Bessemer, 51.50% 5.10 Messabi, non-Bessemer, 51.50%. 4.95 High phosphorus, 51.50% 4.85
Foreign Ores*
C.i.f. Philadelphia or Baltimore
Per Unit
Iron, low phos., copper free, 55
to 58% dry, Algeria 13c. Iron, low phos., Swedish, aver-
age, 68½% iron
dish, aver. 65% iron 11c.
Iron, basic or foundry, Russian, aver. 65% ironNominal
Man., Caucasian, washed 52% 50c. Man., African, Indian,
44-48% 45c.
Man., African, Indian, 49-51% 45c.
Man., Brazilian, 46 to
Per Short Ton Unit Tungsten, Chinese, Wolframite,
duty paid, delivered. \$23.00 to \$24.00
Tungsten, domestic, scheelite delivered 23.00 to 25.00
Chrome or (lump) c.i.f. Atlantic
Seaboard, per gross
ton: South African
(low grade)\$18.00
Rhodesian, 45% 22.00
Rhodesian, 48% 25.00 Turkish, 48-49% 29.00
Turkish, 45-46% 94 50
Turkish, 45-46% 24.50 Turkish, 40-41% 22.00
Chrome concentrates (Turkish) c.i.f.
Atlantic Seaboard, per gross ton:
48-49%Nominal

* All foreign ore prices are nominal

FLUORSPAR
Per Net Ton
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail
paid \$22.50 to \$23.50 Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illi- nois and Kentucky
mines

FUEL OIL

		I OLL OIL
		Per Gal.
No.	2,	f.o.b. Bayonne, N. J4.375c.
No.	6.	f.o.b. Bayonne, N. J 2.74c.
No.	5	Bur. Stds., del'd Chicago 3.25c.
No.	6	Bur. Stds., del'd Chicago 2.75c.
No.	3	distillate, del'd Cleve'd. 5.375c.
		industrial, del'd Cleve'd. 5.125c.
No.	5	industrial, del'd Cleve'd. 4.25c.
No.	6	industrial, del'd Cleve'd. 4.00c.

COVE

COKE	
Per Net	Ton
Furnace, f.o.b. Connells- ville, Prompt\$5.00 to	
Foundry, f.o.b. Connells- ville, Prompt 5.75 to	6.25
Foundry, by - product Chicago ovens	10.50
Foundry, by - product del'd New England Foundry, by - product	12.50
del'd Newark or Jersey City11.38 to	11.90
Foundry, by - product Philadelphia Foundry, by- product	11.13
delivered Cleveland Foundry, by - product	11.05
delivered Cincinnati Foundry, Birmingham Foundry, by - product	10.50 7.50
del'd St. Louis indus- trial district10,75 to Foundry, from Birming-	11.00
ham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

		TT	-	-			-	-			á
- 6	PΙ	1.1	×	ж	и	л	ĸ	(m)	ъ	4	ч

Base p	
Plates	
Shapes	3.40c.
shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw	
stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35C.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4 000
Wire, black, soft annealed	4.75c. 3.15c.
Wire, galv., soft	
Track spikes (1 to 24 kegs)	3.600
Wire nails (in 100-lb. kegs)	2.65c.
,	

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb. On reinforcing bars base applies to orders of less than one ton and includes switching and starting charge.

All above prices for delivery within the Pittsburgh switching district.

NEW YORK

Base per	Lb.
*Plates, ¼ in, and heavier 3.	
*Structural shapes 3.	75c
*Soft steel bars, round 3.	
fron bars, Swed, char-	010.
coal9.	500
**Cold-fin. shafting and screw	woo.
stock:	
	.09c.
	.09c.
Cold-rolled strip soft and	0000
	51c.
	96c.
	58c.
**Galv. sheets (24 ga.) 5.	23c.
	.90c.
Cold-rolled sheets (20 ga.)	.000.
	.60c.
Deep drawing 4	85c.
	.10c.
	.35c.
	.90c.
	.75c.
	.59c.
SAE, 3100, cold-rolled, an-	.000.
	19c
*Floor plate, 1/8 in. and heavier 5	
Standard tool steel12	50c
Wire, black, annealed 4	
	.70c.
O. H. spring steel, flats 4	.70c.
	.50c.

*For lots 400 to 1999 lb. **For lots less than 1500 lb.

CHICAGO

Base per Lb. Plates and structural shapes 3.55c. Soft steel bars, rounds and
angles
channels and Tees 3.65c. Hot rolled strip 3.60c.
Floor plates 5.15c. Hot rolled sheets 3.35c.
Galvanized sheets 4.85c. Cold rolled sheets 4.30c.
Cold finished carbon bars 3.75c. Above prices are subject to deduc-
tions and extras for quantity and are f.o.b. consumer's plant within Chicago free deivery zone.

CLEVELAND

Base p	er Lb.
Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Cold-fin. bars (1500 lb., over.)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	
Cold-finished strip	
Galvanized sheets (No. 24)	4.72c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heav-	
ier	5.18c.
Black ann'l'd wire, per 100 lb.	\$3.10
No. 9 galv. wire, per 100 lb	3.50
*Com. wire nails, base per keg	
Hot rolled alloy steel (3100)	
Cold rolled alloy steel (3115)	6.75c.
- Control of the Cont	

* For 5000 lb, or less.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lbs. Alloy steel, 1000 lb, and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 400 to 1499 lb.

ST. LOUIS

Base p	
Plates and structural shapes	3.47c.
Bars, soft steel (rounds and	
flats)	3.62c.
Bars, soft steel (squares, hexa-	
gons, ovals, half ovals and	
half rounds)	3.77c.
Cold fin. rounds, shafting,	
screw stock	4.02c.
Galv. sheets (24 ga.)	
Hot rolled sheets	
Galv. corrugated sheets, 24 ga.	
and heavier*	4.57c.
Structural rivets	

* No. 26 and lighter take special prices.

No. 20 and lighter take special prices.
BOSTON
Base per Lb.
Structural shapes, 3 in. and larger 3.85c.
Plates, ¼ in. and heavier 3.85c.
Bars 3.88c.
Heavy hot rolled sheets 3.71c.
Hot rolled sheets 4.21c. Hot rolled annealed sheets 4.61c.
Galvanized sheets 4.61c.
Cold rolled sheets 4.71c.
The following quantity differen-
tials apply: Less than 100 lb., plus
\$1.50 per 100 lb.; 100 to 399 lb. plus
50c.; 400 to 1999 lb, base; 2000 to 9999
lb. minus 20c.; 10,000 to 39,999 lb.
minus 30c.; 40,000 lb. and over
minus 40c.
B11== =

BUFFALO Base p	er Lb.
Plates	3.62c.
Floor plates	
Struc. shapes	3.40c.
Reinforcing bars (20,000 lb. or	3.35c.
more)	2.15c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes	
No. 8 to 30 ga	3.35c.
Galv. sheets (24 ga.)	
Bands and hoops	3.82c.

NEW ORLEANS

MEN ONCENIAS	
Base pe	er Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	
Plates	
Hot-rolled sheets, No. 10	
Steel bands	
Cold-finished steel bars	
Structural rivets	
Boiler rivets	4.50C.
Common wire nails, base per	9 25
Bolts and nuts, per cent off list	6.00
boits and nuts, per cent on list	00

REFRACTORIES PRICES

Fire Clay Brick	
Per 1000 f.o.b. Works	į.
Super-duty brick, at St. Louis.\$60.30	1
First quality Pennsylvania,	
Maryland, Kentucky, Missouri	
and Illinois 47.50	
First quality, New Jersey 52.50	,
Second quality, Pennsylvania,	
Maryland, Kentucky, Missouri	
and Illinois 42.78	5
Second quality, New Jersey 49.00)
No. 1 Ohio 39.90	
Ground fire clay, per ton 7.10	
	,
Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania\$47.50)
Chicago District 55.10	
Diamain other man 47 fel	

Birmingham 47.50
Silica cement per net ton (Eastern) 8,55
Chrome Brick
Net per Ton
Standard f.o.b. Baltimore, Plym-
outh Meeting and Chester \$47.00
Chemically bonded f.o.b. Balti-
more, Plymouth Meeting and
Chester, Pa 47.00
Magnesite Brick
Net per Ton
Standard f.o.b. Baltimore and
Chester\$67.00

Chemically bonded, f.o.b. Balti-
more 57.00
Grain Magnesite
Net per Ton
Imported, f.o.b. Baltimore and
Chester, Pa. (in sacks)\$45.00
Domestic, f.o.b. Baltimore and
Chester in sacks 40.00
Domestic, f.o.b. Chewelah,
Work (in hulls) 22 00

PHILADELPHIA

Base p	er Lb.
*Plates, 14-in. and heavier	3.55c.
*Structural shapes	
*Soft steel bars small shapes,	
iron bars (except bands)	
Reinforc, steel bars, square an	
deformed	
Cold-finished steel bars	
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16	
in. incl	3.\$5c.
*Spring steel	5.00c.
*Hot-rolled anneal. sheets	3.55c.
†Galvanized sheets (No. 24)	
*Diam. pat. floor plates, 1/4 in	5.25c.
-	

*For quantities between 400 and 1999 lb. †For 10 bundles or over. ‡For one to five tons.

BIKMINOHAM
Bars and bar shapes 3.50c. Structural shapes and plates. 3.55c. Hot rolled sheets No. 10 ga 3.35c. Galvanized sheets No. 24 ga 4.75c.
or more
Strip 3.60c. Reinforcing bars 3.50c. Floor plates 5.88 Cold finished bars 4.43 Machine and car-
riage bolts50 & 10 off list
Rivets (structural) \$4.60 base
On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are for consumer plant.

PACIFIC COAST

		ase per L	b.
Oletes temberand	Fran- cisco	Los Angeles	Seattle
Plates, tanks and U. M Shapes, standard Soft steel bars	4.00c. 4.00c. 4.00c.		3.50c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.525c.	open.	2.975c.
(No. 10)	3.75c.	4.00c.	3.70c.
Galv. sheets (No. 24 and lighter	5.15c.	5.00c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.00c.	4.75c.
Cold-finished stee Rounds Squares and		6.60c.	7.00c.
hexagons	8.55c.	7.85c. 8.35c.	8.25c. 8.25c.
Common wire nails—base per kegless carload	-	3.25c.	3.15c.

ST. PAUL

			Base	e per Lb.
Mild steel	bars, re	ounds.		4.10c.
Structural	shapes			4.00c.
Plates				
Cold-finish				4.83c.
Hot-rolled	anneal	ed she	ets,	
No. 24				4.75c.
Galvanized	l sheets	, No.	24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

		D	ETRO	IT :	Base	per	Lb.
Sc	oft steel	bars				. 3.	58c.
St	ructura	shape	es			. 3.	80c.
Pl	ates					. 3.	75c.
F	loor plat	es				5.	42c.
H	ot-rolled	sheet	8, 8	to 30	gage	88	
	above 1						
	in. to 4						43c.
	old-rolle						50c.
	lalvaniz						S4c.
	ot-rolled						68c.
	old-finis						80c.
	old-rolle						40c.
	ot-rolled 3100 Se old-rolle	ries)				. 5.	97c.
501	ATTLE OF CHAME	we million?	7 63 25		and.		

Quantity extras apply to all items. *Price applies only in metropolitan Detroit.

FABRICATED STEEL

. . . Lettings decline to 15,080 tons from 25,770 tons last week . . . New projects sharply higher at 33,430 tons, against 12.855 tons last week.

NORTH ATLANTIC STATES AWARDS

- AWARDS

 2559 Tons, Forest Hills, N. Y., high school, to the Harris Structural Steel Co., Plainfield, N. J.,

 1700 Tons, Brooklyn, N. Y., East New York vocational high school, to Harris Structural Steel Co.

 1600 Tons, Washington, Tower at Naval Medical Center for U. S. Navy, to American Brief Co., Pittsburgh.

 800 Tons veville Island, Pa., shop Villding, for the an Detunning Co., to Pittsburgh.

 650 Tons lege Moor, Pa. E. I. du Pont De Nens & Co., kreis plant addition, to American Bridge Co.

- 650 Tons lige Moor, Tell Splant addition, to Nea S & Co., Kreis plant addition, to American Bridge Co.
 240 Tons, Putnam County, N. Y., state highway bridge RC-4074 FAGH RC-4075, to American Bridge Co.
 215 Tons, Plattsburg, N. Y., paper storage building for Berst-Forster-Disfield Co., building for Berst-Forster-Disfield Co.,

- American

 215 Tons, Plattsburg, A.

 building for Berst-Forster-Dixne...

 to American Bridge Co.

 200 Tons, Springfield, Mass., building for New England Telephone & Telegraph Co., to Haarman Steel Co., Holyoke,

 foundations and floors,
 Navy, to
- Mass.
 Tons, Brooklyn, foundations and floors, building No. 18, for U. S. Navy, to North American Iron Works.
 Tons, Fitchburg, Mass., building for St. Bernard's Convent, to Haarman Steel Co. Tons, Monessen. Pa., Pittsburgh Steel Co., open hearth stripper runway, to Fort Pitt Bridge Works, Pittsburgh.
 Tons, Brooklyn, N. Y., Shore parkway contract MS-39-16, to American Bridge Co.
- Co.
 Tons, Wallingford, Vt., state bridge, to
 Bethlehem Steel Co., Bethlehem, Pa.
 Tons, Hornell, N. Y., Church Street
 bridge, to American Bridge Co. 110 Tons.

THE SOUTH

- 300 Tons, Hartshorne, Okla., state bridge, to Capitol Steel & Iron Co., Oklahoma City. Okla.
- Tons, Medina County, Tex., bridge FAP-270-C (2), to Peden Iron & Steel Co.,
- 255 Tons, Medina County, 270-C (2), to Peden Iron & Steel Co., Houston, Tex.
 180 Tons, San Saba and Lampasas Counties, Tex., bridge FAP-1028-A (1) to Peden Iron & Steel Co.
 145 Tons, Watts Bar, Tenn., T.V.A. 226258 rolled armor, to Dravo Corp., Pittsburgh.
 145 Tons, Perkins, Fla., U. S. Dept. of Justice, dormitories, to Taylor Iron Works Co. Macon. Ga.
- tice, dormitories, to Taylor iron Works Co., Macon, Ga.
 Tons, Copiah County, Miss., highway bridge SP-20-1174-B, to the Virginia Bridge Co., Roanoke, Va.
 Tens, Hutchinson County, Tex., bridge FAP-1020-B (1) to Peden Iron & Steel

CENTRAL STATES

- Nemours & Co., cellophane plant, to American Bridge Co., Pittsburgh.

 610 Tons, various locations, repairs to bridges for Chicago, Milwaukee, St. Paul & Pacific Railroad Co., to Bethlehem Steel Co., Bethlehem, Pa.

 500 Tons, Llewellyn, Neb., state bridge, to Bathlehem Steel Co.
- Co., Bethlehem, Pa.
 500 Tons, Llewellyn, Neb., state bridge, to
 Bethlehem Steel Co.
 254 Tons, Hammiond, Ind., court house, to
 Joseph T. Ryerson & Son, Inc., Chicago,
 through James McHugh Sons, Inc.,
 Chicago, contractor.
 230 Tons, Chicago, repairs to the Straus and
 Schram building, to Wendnagel & Co.,
 Chicago.
- Chicago.

 Tons, Hardin County, Ohio, highway bridge, to the Burger Iron Co., Akron, Ohio.
- Ohio.

 150 Tons, Jefferson, Wis., state bridge No. 666, to Milwaukee Bridge Co., Milwaukee.

 105 Tons, Alkali, Ohio, Diamond Alkali Co., building addition, to Fort Pitt Bridge Works, Pittsburgh.

WESTERN STATES

600 Tons, Albany, Cal., grandstand, to Moore Drydock Co., Oakland, Cal.

- 350 Tens, Los Angeles Metropolitan Water District, to Consolidated Steel Corp., Los
- Angeles.

 170 Tons, Fremont County, Wyo., bridge, to Des Moines Steel Co., Des Moines, Iowa.

 117 Tons, Palo Alto, Cal., underpass to Bethlehem Steel Co., San Francisco, through Paul J. Tyler, Oroville, Cal., contractor.

FABRICATED PENDING NORTH ATLANTIC STATES

- NORTH ATLANTIC STATES

 550 Tons, Linden, N. J., storage building and factory building addition for General Motors Corp.

 500 Tons, Ft. Monmouth, N. J., laboratory and shop buildings for U. S. Government.

 325 Tons, Orange, N. J., cellars to building for Joha F. Trommer, Inc.

 300 Tons, Aqueduct, N. Y., grandstand roof for Queens County Jockey Club.

 725 Tons, Scranton, Pa., mill building alterations for Scranton Lace Co.

 200 Tons, Plaistow, N. H., highway overpass.

 125 Tons, Belmont Park, N. Y., grandstand

- extensions for Westchester Racing Asso-
- ciation.

 110 Tons, Jersey City, N. J., conveyor bridges
 for Colgate-Palmolive-Peet Co.
- SOUTH AND SOUTHWEST
- 900 Tons, Pensacola, Fla., seaplane hangar for U. S. Navy.
 300 Tons, Gravel Switch, Ky., lifting towers, etc., Kentucky Dam.

CENTRAL STATES

- central States

 200 Tons, Rantoul, Ill., hangar and technical
 school for U. S. War Department; bids,
 Dec. 27.

 300 Tons, Saginaw, Mich., store building for
 F. W. Woolworth Co.

 100 Tons, Chicago, repairs 63rd Street line,
 Chicago Rapid Transit Co.

WESTERN STATES

- WESTERN STATES

 16,595 Tons, Redding, Cal., Pit River bridge superstructure (Specification 885); bids, Jan. 16, 1940.

 9600 Tons, Pear Harbor, T. H., two graving docks. Tonnage distributed as follows; H-type bearing piles (Note: NOT sheet piling), 8000 tons; fabricated steel shapes, 1600 tons; bids, Dec. 20.

 500 Tons, Albany, Cal., regional agriculture laboratory buildings; bids in.

 200 Tons, Arsenal, Utah, dunnage for bomb storage magazine, for U. S. Army.

 125 Tons, San Francisco, Outer Mission Junior High School gymnasium; N. H. Sjoberg & Son, Oakland, Cal., contractor.

- tor. 100 Tons, Mare Island, Cal., loading plant at
- Navy Yard. 125 Tons, Alaska, radio towers for U. S.

NLRB Dismisses Complaint Against Decatur Iron & Steel

7ASHINGTON - The National Labor Relations Board has announced dismissal of a complaint against Decatur Iron & Steel Co., Decatur, Ala., based upon allegations by the SWOC that the company had discharged Walter W. Millican for union activities.

The board found that the company, while denying the allegation, had negotiated with the board's Atlanta regional director in settlement of the dispute and had agreed to post notices in compliance with the National Labor Relations Act and to reinstate Millican without loss of seniority, but without mention of back pay, during a conference held on Oct. 5, 1938. The board accepted the company's definition of the terms of the settlement, since there was no evidence the board said, that the regional director had objected, and no evidence that the company had notice of the regional director's intention to submit the agreement to the union for approval at the time of the settlement offer. The union refused the settlement on the grounds that back pay should have been included.

Regional Director Upheld

The board pointed out that settlement of an unfair labor practice charge even though participated in by the board's agents does not preclude it from proceeding to a final determina-

"Nevertheless," the board held, "effective administration of the act requires that the board's agents have the respect and confidence of parties with whom they negotiate. Repudiation by the board of agreements entered into in good faith and in reliance upon the representations of its agents would necessarily impair such respect and confidence. In the case before us, we believe that the policies of the act will best be effectuated by giving effect to the agreement made between the respondent and the regional director.'

Hayes Body Corp. Will **Expand Aircraft Division**

H AYES BODY CORP., Grand Rapids, Mich., manufacturer of automobile bodies and special metal products, is arranging for an expansion in operations for production of aircraft and parts, airplane accessories, etc., and will provide new plant facilities for this purpose. The company soon will increase capital from \$1,000, 000 to \$2,000,000, common stock, a portion of the proceeds to be used for the purposes noted. The company name will be changed to Hayes Mfg. Corp.

Britain to Admit Steel Duty Free

ONDON (by Cable)—The following imports into United Kingdom are free of duty as from Dec. 5 but are expected shortly to come under the import license system: steel ingots, blooms, billets, slabs, girders, beams, joists, angles, shapes, sections, bars, rods, plates, sheets, hoops, strip, rails,

THIS WEEK'S MACHINE ...TOOL ACTIVITIES ...

... Domestic demand still lagging behind foreign sales ... Initial phases of French buying program concluded last week ... Extended deliveries holding up new sales of large size equipment ... Many plants engaged at 100 per cent of capacity.

Domestic Demand Still Lags Behind Export Demand

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CINCINNATI—The machine tool mar-mains unchanged from last week, with ordering continuing brisk, but without the almost hysterical appearance of a month and a half ago. The domestic demand continues to make progress upward, but as yet has not quite reached the proportions of export business. Drilling machinery, which heretofore had been a trifle slower than the market generally, has now picked up to the market average with domestic demand a little broader on this type of tool than on the others, bringing the ratio between export and domestic business about equal. Milling machines of standard types are still active on current demand, with lathes running a close second. Grinding machinery and shapers and brakes are also very noticeable on the week's demand. Orders run from a single unit to substantial multiple unit orders.

Deliveries are continuing to disturb sellers and some business is lost because of inability to meet delivery demand. No change in the extension of shipments has arisen during the past week, plants still quoting five to eight months, with the longer period more frequent. Production is going at capacity with still some possible room for expansion if the supply of skilled labor were more plentiful.

French Buying Group Completes Initial Program

NEW YORK—While negotiations continue to go forward on the purchase of scattered types of machine tools, the initial huge buying program on the part of the French missions has largely been completed. Estimates of business placed by the French Air and Munitions Ministries in the past few weeks range all the way from \$40,000,000 to \$90,000,000. Certainly the early inquiries were for large batches of standard machines, running into the thousands for each type of machine tool in many instances. negotiations were largely completed last week when over 80 top executives of the industry were in New York to sign the contracts. Many details, however, yet to be worked out. Deliveries will extend through the end of 1940, beginning about March 1. Meanwhile the used and rebuilt machinery market is being canvassed for machine tools needed imme-

There has been no apparent let-up in the pace of buying on the part of the Japanese, and Russian buying continues, though on a lesser scale than before. British buying is still being handled through established agents abroad.

Northern Ohio Tool Plants Working at 100% of Capacity

CLEVELAND—At the close of November a number of dealers here report total dollar volume during the month a trifle better than October. Billings, however, were forced down due to extended deliveries. The past week proved moderately active, with several customers forced to turn to rebuilt equipment instead of the new machines originally expected. A down-state company is understood to be in the market for a large planer for a new plant addition. Activity at Detroit has picked up in the automotive industry.

Production continues at a full 100 per cent in Ohio. Several persons have reported being approached on the subject of getting into the machine tool business for the duration of the war on former models with necessary patterns, drawings, jigs, and fixtures supplied them.

Extended Deliveries Holding Up Large Machine Sales

CHICAGO—Deliveries have finally become so extended in the case of many types of machines that the volume of new orders in the Chicago district is suffering as a result. Some sellers report units as numerous as in previous months, but dollar volume is off, as much as one-third in one instance, because delivery of large expensive machines is most difficult to obtain, and orders are for smaller machine tools. Small tool business during November showed a 10 per cent increase. It is believed here that business will proceed through December at approximately last month's rate.

Auto Plants Marking Time for Initiation of New Models for 1941

DETROIT—December machine tool business appears likely to follow the usual pattern for the automotive industry at this time of year, with some exceptions attributable to special activities. As is normal, the auto plants are now midway between the tooling programs they have just completed and the initiation of new programs for 1941 models, with the result that there is little activity except in the form of preliminary inquiries. Ford proves to be one exception and there is buying activity reported there. Meanwhile, the two projects for tooling up to produce Rolls-Royce aircraft engines are moving along smoothly—with some business already placed.

Booklet Gives Wage Policies In Effect at Bethlehem Steel

BETHLEHEM STEEL CO. is paying its employees an average wage of 91.2c. per hr. compared with 69.2c. in 1929 and 22c. in 1914, the Bethlehem Review, a publication for employees, reports in its December issue. The average wage is given as \$7.03 a day. The company's wage policy is described as follows:

"Bethlehem's wage policy is to pay wages that are as high as possible consistent with responsibilities to all concerned. In carrying out that policy, it has paid and is now paying at its plants and properties wage rates equal to or higher than those paid by its competitors and other industries operating in the locality in which it operates for comparable work and under conditions requiring equal skill and efficiency."

The Review carries the following table of information on working conditions in its plants:

Standard work day 8 hours Standard work week 40 hours Overtime pay

for over 8 hr. per day or over

in effect 23 years resulting in a reduction in accidents of.....81% Pensions Number of persons currently on

THE IRON AGE, December 7, 1939-117

PLANT EXPANSION AND EQUIPMENT BUYING

♦ NORTH ATLANTIC ▶

Union Bag & Paper Corp., Woolworth Building. New York, plans three-story addition to kraft paper mill at Savannah, Ga., to be equipped as an evaporator house and other production service. Cost close to \$100,000 with equipment.

Miller & Van Winkle Co., 18 Bridge Street, Brooklyn, manufacturer of precision springs

for aircraft engines, aeronautical instruments, etc., has arranged for purchase of mill of Apex Oriental Corp., 155 Sherman Avenue, Paterson, N. J., totaling about 50,000 sq. ft. of floor space. Improvements will be made of floor space. Improvements will be made in structure and present works removed to

new located where capacity will be inc eased.

Commander Officer, Ordnance Department,
Watervlie senal, Watervliet, N. Y., asks
bids until 12 for steel wrench forgings Circular 2 , steel hobs (Circular 292).

Aviation Mfg. Corp., 420 Lexington Avenue, (Circular

New York, military and commercial airplanes, aircraft engines, parts, etc., has let general contract to Rock City Construction Co., 135 Fourth Avenue North, Nashville, Tenn., new plant on Murfreesboro Road, near Berry municipal airport, Nashville, of main one-story unit, 300 x 405 ft., for parts production and assembling, and smaller structures, with two-story administration building. Plant will total about 150,000 sq. ft. floor space. Cost close to \$1,000,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer; Marr & Holman, Stahlman Building, Nashville, are associated architects. Aviation com-pany has plans maturing for expansion and improvements in Lycoming Division plant, Williamsport, Pa., manufacturer of airplane engines and parts, including new one-story additions and installation of equipment. Cost about \$400,000, instead of smaller sum pre-viously noted in these columns. Work is scheduled to be carried out early in 1940.

Airway Model Plane Co., Brooklyn, manufacturer of model aircraft and submarines, has leased two-story industrial building at Nostrand Avenue and Kosciusko Street, and will occupy for plant, expanding

present capacity.
Signal Corps Procurement District, Army Base, 58th Street and First Avenue, Brooklyn, asks bids until Dec. 12 for quantity of storage batteries (Circular 180); until Dec. 22 for spare parts for transmitting equipment, etc.

(Circular 183).

Wishnick-Tumpeer, Inc., 295 Madison Avenue, New York, manufacturer of industrial chemicals, etc., has let general contract to Robert Gavel & Co., 3128 North Kenneth Street, Chicago, for one-story and basement building at 51st Street and Merrimac Avenue, Stickney, near Chicago, where the reach was a street of the street and the street of the street and the street of the stree Stickney, near Chicago, where site recently was acquired, forming initial unit of new plant. Cost close to \$50,000 with equipment. Jacob Lewis, 30 North Dearborn Street, Chicago, is

Bureau of Yards and Docks, Navy Department; Washington, plans new naval air base for coast patrol planes on tract of about 18 acres of land fronting on Jamaica Bay, Brooklyn, adjoining municipal Floyd Bennett air field, now being secured from city, to include two steel hangars, two two-story buildings mechanical shops and other service, and gasoline storage tanks and other struc-tures. Appropriation of about \$500,000 has been authorized.

Quartermaster Supply Officer, Army Base, 58th Street and First Avenue, Brooklyn, asks bids until Dec. 12 for 105 warehouse trailers, four-steel wheel, caster-type, molded-on solid rubber tires, capacity of platform 5000-lbs... with two pipe racks (Circular 626-149). Hygienic Tube & Container Corp., 34 Ave-

nue L, Newark, N. J., manufacturer of un-

breakable containers, tubes, etc., plans two-story addition, 260 x 380 ft., with extension, 90 x 180 ft. Cost close to \$275,000 with equipment. D. Sichel, 24 Commerce Street, is ar-chitect; Saul Shaw & Co., 24 Walnut Street, are consulting engineers.

Kerr Concrete Pipe Co., 265 River Drive, Passaic & New York Railroad, East Paterson, N. J., 337 x 1600 ft., improved with three one-story buildings, and will modernize and

equip for new plant.

Standard Pressed Steel Co., Stewart and Kenmore Avenues, Jenkintown, Pa., has let general contract to Townsend, Schroeder & Wood, Inc., 1700 Sansom Street, Philadelphia, for one-story addition, 60 x 120 ft., for storage and distribution. Cost close to \$40,000 with equipment. Widdecombe Engineering Co., 1700

Sansom Street, Philadelphia, is engineer.
Commanding Officer, Ordnance Department,
Frankford Arsenal, Bridesburg, Philadelphia,
asks bids until Dec. 12 for quantity of steel
shelving (Circular 775).
American Viscose Corp., Marcus Hook, Pa.,

plans modernization and improvements in several units at local mill, with installation of additional equipment. Cost reported over \$150,000 with machinery. Main offices are at 200 Madison Avenue, New York.

■ BUFFALO DISTRICT ▶

Simonds Saw & Steel Co., Ohio Street, Lockport, N. Y., has let general contract to Austin Co., Cleveland, for one-story addition, 40 x 350 ft. Cost over \$60,000 with equipment. Main are at Fitchburg, Mass.

Electric Specialties, Inc., Jefferson Avenue, Canandaigua, N. Y., plans new one-story plant on local site, 75 x 110 ft. Cost over \$50,000 with equipment. J. C. Rah is company engi-

♦ NEW ENGLAND ▶

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. for four motor-driven crank shedule 7932) for Portsmouth, N. H., shapers Yard; two motor-driven engine lathes (Schedule 7969), one motor-driven milling machine (Schedule 7970); until Dec. 15 for one hydrau-lic test pump (Schedule 7942), one motor-

driven vertical metal shaper (Schedule 7944)
for Submarine Base, New London, Conn.
School Board, Westwood, Mass., plans
manual training department in new two-story and basement senior and junior high school at Nahatan and High Streets, for which bids are being asked on general contract. Cost about \$250,000. Markus & Nocka, 184 Boylston

Street, Boston, are architects.

Armstrong Rubber Co., 475 Elm Street,
West Haven, Conn., automobile tires and
tubes, etc., has let general contract to Edwin Moss & Son, Inc., 555 Grant Street, Bridge-port, Conn., for four-story addition, 100 x 180 ft. Cost about \$200,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue. Bridgeport, Conn., is architect and engiequipment.

■ WASHINGTON DIST. ▶

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Dec. 11 senal, Engewood, and, asks blue until Dec. 11 for 25 chemical projector body shells, 25 forgings from which such shell bodies may be machined, and two chemical projector barrels (Circular 321); until Dec. 12 for one scrubbing lower with acid-alkali proof lining (Circular 330).

Funkhouser Co., Hagerstown, Md., manu-lecturer of roofing products, etc., has acquired local industrial property, comprising several one-story buildings, and will improve and equip for occupancy by Victor Products Co., manufacturer of coolers, etc.; Potomac Machinery Co., machinery and parts; and Torvic Laboratories Co., manufacturer of chemical specialties, etc., all of Hagerstown and all affiliated with first noted company. Cost about \$100,000 with equipment.

General Purchasing Officer, Panama Canal,

General Purchasing Officer, Panama Canal, Washington, asks bids until Dec. 11 for three prefabricated steel sheds, 40 x 100 ft. each; also three similar sheds, 20 x 40 ft. each (Schedule 3766); until Dec. 12 for 50 tender-brake shoes for 33-in. dia. cast iron wheels (Schedule 3756), axles for passenger coaches; 600.25-cm] conseiting wheels are constant of the contraction 600 25-gal, capacity garbage cans, galvanized, without covers; 600 galvanized garbage can covers; handles for barrel hand trucks, etc. (Schedule 3760); until Dec. 13 for 48,920 galvanized steel machine bolts, 11,000 lbs. of galvanized wrought iron or steel plate wash-50,000 lin. ft. of galvanized wrought iron chain, 8250 lin. ft. of copper cable, gate valves, portable voltmeter (Schedule 3769), two clam-

shell buckets, 1½ and 1½-cu. yd. capacity, respectively (Schedule 3771).

American Zirconium Corp., 6401 St. Helena Avenue, Baltimore, has let general contract to H. K. Ferguson Co., Cleveland, for threestory addition, 58 x 72 ft. Cost close to \$50,000

with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 12 for one hydraulic tension testing machine (Schedule 7927) for Annapolis, Md., naval station; six motor-driven engine lathes (Sched-7928), one motor-driven plate bending roll (Schedule 7968), one motor-driven planer and matcher woodworking machine (Schedule 7967), one motor-driven bolt-threading ma-(Schedule 7952) for Philadelphia Navy Yard; one motor-driven vertical bending roll, complete with equipment (Schedule 7966) for Alexandria, Va., yard; one motor-driven metal shaper and one index center (Schedule 7874), one motor-driven rod and dowel machine (Schedule 7875), quantity of lead pipe (Schedule 7861) for Eastern and Western Navy

■ SOUTH ATLANTIC

Public Works Officer, Naval Air Station, Pensacola, Fla., asks bids (no closing date stated) for one electric generator set for emergency service, switchboard and accessory equipment (Specifications 9470). switchboard

A. B. Curry, city manager, Coral Gables, Fla., asks bids until Dec. 19 for one municipal

ria., asks bids until Dec. 19 for one municipal incinerator plant, 50-ton capacity.

Carnation Co., North Van Buren Street, Milwaukee, condensed and evaporated milk products, plans new branch plant at Statesville, N. C., comprising several one-story units. for processing of condensed milk. Cost close to \$200,000 with equipment.

♦ SOUTH CENTRAL ▶

Standard Oil Co. of Louisiana, Baton Rouge, La., asks bids until Dec. 15 for construction of fixed type oil loading and unloading dock, 50 ft. wide and 1000 ft. long, at North Baton Rouge, to be used in conjunction with new bulk oil storage and distributing terminal at that place.

United States Engineer Office, Vicksburg, Miss., asks bids until Dec. 11 for one gaso-line engine-driven electric welding machine

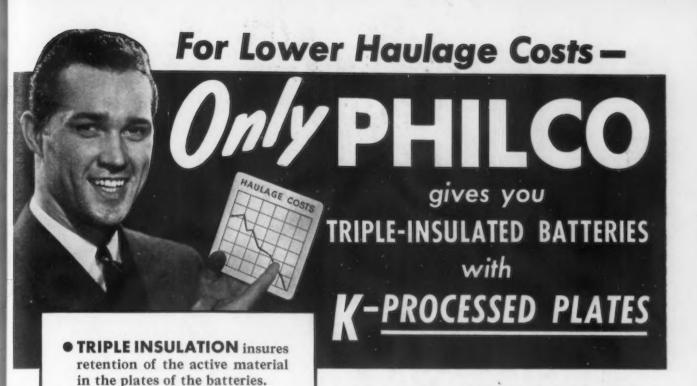
(Circular 112). United States Engineer Office, Mobile, Ala., Asks bids until Dec. 21 for one crawler-type, full-revolving, diesel engine-driven dragline excavator (Circular 151).

Director of Purchases, Tennessee Valley Authority, asks bids until Dec. 15 for lifting towers, operating machinery, electrical equip-

ment and accessories for temporary structure over Lock Harbor, Kentucky dam.

♦ SOUTHWEST

Keystone Trailer & Equipment Co., 2100 East Tenth Street, Kansas City, Mo., has let general contract to A. I. Morris, 7118 McGee Street, for one-story addition, 36 x 125 ft.



 K-PROCESS produces a plate, flint-hard throughout, yet porous for easy absorption of acid.

Ma-

bout

can etc.

its

 HIGH POWER ABILITY and Sustained Voltage step up production and cut current costs.

 SUPER-EFFICIENCY handles the difficult jobs at high speed.

TREMENDOUS RESERVE
 POWER takes care of the heaviest loads.

 EXTREME DEPENDABILITY and Great Ruggedness give trouble-free day in and day out performance in your hauling.

 LONG LIFE assures extra years of operation and low-cost service. The new Philco Triple-Insulated Batteries with K-Processed Plates give real haulage economy. Moderate initial cost and lowest monthly maintenance cut your haulage costs to an absolute minimum. And the new, efficient and dependable Philco assures steady, continuous performance. You will want to thoroughly investigate this new Philco development . . . judge the efficiency and economy yourself. Write for a Philco Engineer to discuss YOUR problem.

PHILCO, Battery Division
Dept. 307, Philadelphia, Pa.

Cost close to \$50,000 with equipment. C. M. Villiams, 4301 Main Street, is architect. Hunkins-Willis Lime & Cement Co., 4480

Duncan Avenue, St. Louis, has approved plans for one-story addition, 28 x 100 ft., for storage and distribution. Cost about \$45,000 with mechanical-handling and other equipment. Preston J. Bradshaw, Inc., 718 Locust Street, is architect.

Kansas City Southern Air Lines, Eleventh and Wyandotte Streets, Kansas City, Mo., Clarence Belinn, general manager, plans new airline base at Shreveport, La., including steel hangar, machine and repair shops, oil and gasoline storage and distributing facilities, training school and other structures. Cost about \$150,000 with equipment.

Humble Oil & Refining Co., Humble Building, Houston, Tex., has let general contract to Brown & Root, Inc., 4300 Calhoun Road, for expansion in oil refining plant at Corpus Christi Tex. comprising several new production units, including improvements in present refinery. Cost reported over \$1,500,000 with equipment.

Commanding Officer. Ordnance Department, San Antonio Arsenal, San Antonio, Tex., asks bids until Dec. 14 for two electric-operated portable drills, %-in. capacity (Circular 28).

■ WESTERN PA. DIST. ▶

Vulcan Detinning Co., Neville Island, Pittsburgh, has let contract to Pittsburgh-Des Moines Steel Co., Neville Island, for one-story to. Pittsburgh-Des addition, 165 x 380 ft. Cost over \$100,000 with equipment. Dravo Corp., 300 Penn Ave-

Pennsylvania Industrial Chemical Co., Clairton, Pa., has begun construction of new two-story plant on local site. Cost close to \$60,000 quipment.

United States Engineer Office, New Post Office Building, Pittsburgh, asks bids until Dec. 11 for one special analysis cast iron air vent, two 36-in. special analysis cast iron couplings, one 24-in. special analysis cast iron connector, bolts, gaskets, pipe fittings, parts, etc., for Loyalhanna dam (Circular 320), one iron body, flanged gate valve, complete with operating stand, and one 8-in. similar valve, same dam (Circular 321).

◆ OHIO AND INDIANA ▶

Columbus Heating & Ventilating Co., 182 North Yale Avenue, Columbus, heating and ventilating equipment, has let general contract to F. & Y. Construction Co., 328 East Town Street, for one-story addition, 40 x 115 Cost close to \$45,000 with equipment.

City Engineering Co., Second and Webb Streets, Dayton, Ohio, manufacturer of tools, dies, special machinery, parts, etc., has let general contract to A. P. Ziegler, Macy Avefor one-story addition. Cost close to \$40,000 with equipment.

Kroger Grocery & Baking Co., 35 East Seventh Street. Cincinnati, has let general contract to Ulen & Co., 120 Broadway, New York, for one-story addition, 180 x 280 ft., to branch plant at 3688 Chouteau Avenue, St. Louis, including improvements in present bakery. Cost close to \$100,000 with equipment. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers. St. Louis offices of company are at 1311 South Thirty-Street. Company also has approved plans for new one-story factory branch, stor-age and distributing plant at Carbondale, Ill.

Cost about \$75,000 with equipment.

Hanna Coal Co., Leader Building, Cleveland, plans early rebuilding of tipple at coal-mining properties at Dunglen, Ohio, recently destroyed by fire. Loss about \$50,000 with equip-

Contracting Officer, Materiel Division, Air orps, Wright Field, Dayton, Ohio, asks bids until Dec. 11 for one lathe, one drill press and one bench grinder, all motor-driven (Circular 695), quantity of ignition coils (Circular 692); until Dec. 12 for four balloon cable junction clamp anchor assembly. 48 control cable connector assemblies, four balloon cable junction clamp guide plates, 50 ground maneuvering roller assemblies, stabilizer base attachments, internal suspension cable (Circular 696), quantity of center punches and drive pin punches, respectively (Circular 683), quantity of flexible connector aircraft battery terminals (Circular 711), 80 to 140 cylindrical tanks, each 25,000-gal, capacity (Circular 677); until Dec. 13 plain oilless bearings (Circular 715). 13 for 810

Coca-Cola Bottling Co., 924 LaFayette Avenue, Terre Haute, Ind., has approved plans for new two-story mechanical-bottling plant, 65 x 100 ft., and will carry out erection by day labor. Cost close to \$50,000 with equipment Miller & Verger Core, House Ruilding. day labor. Cost close to \$50,000 with equip-ment. Miller & Yeager, Opera House Building, Indianapolis, are architects.

Shamrock Trailers & Parts Co., 12321 Turner Street, Detroit, has approved plans for one-story plant on Lesure Avenue. Cost

ose to \$40,000 with equipment.

Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., M. C. J. Bil ich., has let general contract to Billingham, Kalamazoo, for twostory additions to mill at Parchment, near Kalamazoo. Cost reported over \$85,000 with equipment.

Park Chemical Co., 8074 Military Avenue, Detroit, industrial chemicals, has begun erection of one-story addition, for which general contract recently was let to Bennage & Mc-Kinstrie Co., 4612 Woodward Avenue. Cost reported close to \$40,000 with equipment.

■ MIDDLE WEST

National Die Casting Co., 600 North Albany Avenue, Chicago, has leased one-story indus-trial building at Chicago and North Albany Avenues, about 28,000 sq. ft. of floor space, and will equip for expansion. Present works will be continued at first noted location, as heretofore.

A. M. Castle & Co., 1300 North Branch Street, Chicago, iron and other metal prods, has let contract to W. J. Lynch Co., South LaSalle Street, for foundations for one-story storage and distributing building, 90 x 450 ft., at 1440 North Cherry Avenue. Award for superstructure will be made soon. Cost close to \$135,000 with equipment. Shaw, Naess & Murphy, 80 East Jackson Boulevard, architects

Schreier Malting Co., 704 South Fifteenth Street, Sheboygan, Wis., will soon begin superstructure for one-story addition for storsoon begin age and distribution, for which general contract recently was let to McKenzie-Hague Co., Inc., 53 West Jackson Boulevard, Chicago.

Cost close to \$50,000 with equipment.

Northern States Power Co., 15 South Fifth Street, Minneapolis, Minn., plans addition to steam-electric generating station at St. Cloud. Minn., 60 x 120 ft., with installation to include new 7500-kw. turbine-generator unit and accessories, boiler and auxiliary equipment. Work is scheduled to begin early next spring. Cost about \$600,000 with equipment.

United States Engineer Office, Fort Peck, Mont., asks bids until Dec. 12 for grinding crankshafts as required during period from Jan. 1 to June 30, 1940 (Circular 109).

Nebraska Consolidated Mills, Inc., Omaha, Neb., plans rebuilding of three-story flour and grain mill at Ravenna, Neb., recently destroyed by fire. Loss about \$100,000 with equipment.

A. Y. McDonald Mfg. Co., 12th and Pine Streets, Dubuque, Iowa, manufacturer of heating and plumbing equipment, plans two-story addition, 50 x 268 ft., to be used primarily for production of plumbers' brass goods. Cost over \$80,000 with equipment. Cullen & Bartels, Lincoln Building, are consulting engineer

Constructing Quartermaster, Chanute Field, Rantoul, Ill., asks bids until Dec. 22 for water pumping and treatment plant at local field (Circular 6627-52).

♦ PACIFIC COAST ▶

Aero Industries Technical School, 5245 San Fernando Road, Los Angeles, has let general contract to Myers Brothers, 3407 San Fernando Road, for one-story machine shop, 50 x 120 ft. Cost close to \$40,000 with equipment. Edward P. Finegan, 317 South Palm

Drive, Beverly Hills, Cal., is architect.

Pommerelle Wine Co., 9117 East Marginal Way, Seattle, plans installation of machinery Way, Seattle, plans installation of machinery for a fruit distillery in existing one-story building, which will be remodeled and im-proved. Cost about \$40,000. Harry G. Ham-mond, Textile Tower Building, is architect. Commanding Officer, Ordnance Department,

Benicia Arsenal, Benicia, Cal., asks bids until Dec. 12 for one motor-driven selective gearedwith precision screw-cutting features, suitable for manufacture of fine tools (Circular 32); until Dec. 19 for one belt-driven planer and matcher, 15 x 6 in., flexible coupling, complete with motor, all parts and equipment (Circular 36).

Board of Education, 1151 South Broadway, Los Angeles, plans one-story vocational shop conjunction with several other buildings at South Gate junior high school. Entire project will cost close to \$400,000. A. S. Nibecker, Jr., is architect for board. Holmes & Narver, 639 South Spring Street, are mechanical engineers

Continental Grain Corp., Longview, Wash., operating local port grain elevator under lease, plans additions to plant to increase storage and handling capacity by 400,000 bu. Cost close to \$120,000 with elevating, conveying, screening and other mechanical equip-ment. Nicholas Carter, Vancouver, B. C., is

consulting engineer.

Bureau of Supplies and Accounts, Navy
Department, Washington, asks bids until Dec.
12 for one electric arc welding set and accessories (Schedule 7866), one motor-driven rotary swaging machine (Schedule 7888) for Diego, Cal., naval air station; salinity indicating equipment, spare parts and tools (Sched-ule 7889), one motor-driven sand-conditioning unit (Schedule 7890); until Dec. 19 for quantity of admiralty condenser tubes (Schedule acetylene gas cylinders (Schedule 7978) for Mare Island, Cal., Navy Yard: until Dec. 15 for one precision bench lathe (Schedule 7919), one power squaring shears (Sched-7920) both motor-driven, for Puget Sound, Wash., Nevy Yard.

Board of County Supervisors, Hall of Records, Los Angeles, asks bids until Dec. 12 for 350-hp. watertube boiler and auxiliary equipment for installation in boiler plant at Hall of Records (Specifications 528).

◆ FOREIGN ▶

Ministry of Finance, Mexico, D. F., plans new cellulose mill to be constructed and operated under Federal control, consisting of several one and multi-story units, power house, machine shop, pumping station and other mechanical departments. Estimated cost 2000 000 process (chept. \$53,900) with equipment of the control o 3,000,000 pesos (about \$612,000), with equipment. A Government committee, headed by Eduardo Suarez, Minister of Finance, is in charge. Fernando Galvan, managing director. Productura de Papel, S. A., Mexico, D. F., large paper manufacturer, has prepared plans for mill and will supervise project.

TRADE NOTES

The State of Connecticut has placed an order with Veeder-Root, Inc., Hartford, for 840,000 small metal clip plates, each 2 in. square, on which the numerals "40" are to be die-stamped out. These small plates are affixed each year to the permanent plates of heavy aluminum used in that state.

Durkee Marine Products Co., 2053 Clove Road, Grasmere, S. I., N. Y., was recently organized to manufacture marine hardware and brass, bronze and aluminum castings. Officers are D. M. Loughman, president; Charles H. Durkee, vice-president; Cyril G. Cogswell, treasurer, and Beekman Aitken. secretary.

Iron & Steel Products, Inc., Chicago, has closed its Tulsa, Okla., branch office.

Reichold Chemicals, Inc., Ferndale, Mich., has purchased a site for the erection of an addditional structure for a warehouse planned to be 50 x 200 ft. and 25 ft. high.



JUST BETWEEN US TWO

Proofreaders' Double Fault

Until last week we had envied the Saturday Evening Post its freedom from typographical errors, a perfection attained, we supposed, by proofreading everything at least three times. Being handled with almost newspaper speed, multiple proofreading is handled. With almost newspaper speed, intuffice proofreading is a luxury forbidden your favorite family journal. Forms close late Tuesday; presses run all night; copies are in the mails Wednesday morning, and reach you Thursday morning.

But when proofs were read for the Dec. 2 editorial page of

the Post all of the three proofreaders must have been suffering from the same hangover, for they let two typographical errors ride through in the same editorial. Monsanto Chemical Company's name is spelled "Montsanto" and McKiernan-Terry Corp. is hamburgered into "McKerinan-Terry."

Hell Hath No Fury

Out of professional courtesy we would not have mentioned the Post's double somersault from typographical grace if it were not for the fact that the Post has slighted us. It asks, "In which weekly magazine does business place the greatest volume of

advertising?" and answers its own question by naming itself, Collier's and Life in win, place and show positions respectively. How about us? We are a weekly magazine, and as far back as we care to remember The Iron Age has been first in advertising volume. Last year we had 3809 pages to the Post's 2321, and in the first 10 months of 1939 we had 3316 to the Post's 2166. A clipping of this item is being sent to Wesley Stout, the Post's editor, in the hope that he will do the manly thing.

Adder Spits Balm

For years now we have been getting a sulphurous letter every week from an anonymous Chicagoan who signs himself "S.W." and who is sore because we do not wave the Red Flag as enthusiastically as the Daily Worker does. So you could have floored us with the butter pat you get with the 30¢ lunch when he started his latest letter, "The sort of thing I like about The Iron Age is." This is the started him to the started his latest letter of thing I like about The Iron Age is..." This is the same as if the wolf in Little Red Ridinghood wagged his tail instead of nibbling on grandma. When we came to, we continued to read:

"... the thing I like is on page 112 of your Nov. 23 issue (Arnold Hits Illegal Union Activities in Building Industry). No Chicago newspaper published Thurman Arnold's words in this way. They made it out that he was fighting all labor unions, not the ... racketcers."

The man who squeezed this shot of Christmas Night from the Chicago carboy of H₂SO₄ is our Washington editor, Leon Wesley Moffett, whose reporting of Washington developments is superb in a big way.

Lachrymal Selling

Speaking of red flags, Sam DeWolf, who travels the Pennsylvania Dutch country for us, reports this sign in Hamburg, Pa.:

JACOB T. MUNTZ
BLACKSMITH, HORSESHOER & AUCTIONEER
SALES CRIED AT REASONABLE PRICES

It isn't an antique; the paint is new, indicating that sales crying is a living art in eastern Pennsylvania.

Puzzles

The one about Diophantus' age was pie to Leslie H. Snider of the Indiana Steel & Wire Co., and the same for the acidulous McC. of Baltimore, who pats himself on the back for figuring out the Nov. 16 one about the brigades, and then remarks nastily about our habit of exposing this journal's virtues.

The male member of last week's century-old pair was 55-5/9, and his wife 44-4/9.

Our own taste in problems runs to those that would worry a member of the retarded section of the sixth grade about ten seconds, like the following. If your answer to it is virtually a mental reflex—a four second response—thank your forebears for a well oiled cerebral equipment:

A man has 50 pairs of socks, 25 pairs of white and 25 pairs of black, in a drawer. He asks his blind valet to get him one complete pair of either black or white. How many socks does the valet have to take out of the drawer to be assured of getting a complete pair of either black or white?



Parts Manufacturer Increased Profits

A supplier of parts to motor car manufacturers was faced with the problem of substantially increasing his production to meet the larger schedules set up by a car manufacturer. Uniformity and quality of welds had to be maintained along with increased output.

They found the answer in two ACE Motor-driven Welders operating 24 hours a day (three shifts), with each Welder operator requiring from four to six girls to handle the fixtures. . . . Features of design and con-

struction found on no other Welders are responsible for the high rate of output of which the above is an example.

ACE (Peer) Welders can . help you too,-at low initial and maintenance costs. They are made in both manual and automatic motor-driven models, up to 50 KVA capacities. Write for Specification Sheets. PIER EQUIPMENT MFG. CO., 1402 Milton Street, Benton Harbor, Michigan.



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Complete the job in one handling. Eliminate the cost of expensive Dies.

No. 11 Double Lever Cutting Shear for cutting inside openings or

No. 11 Double Lever Cutting Shear for Cutting inside optimings of corner notching.

No. 20 for accurately punching holes in sheets without marking, by using our Horse Shoe Gauge Templets, which are clamped on 2 to 4 sheets to be punched at one time.

Both machines are used by Stove Works, Kitchen Equipment, Cabinet and Metal Sign Mfrs., and general Sheet Metal Shops.

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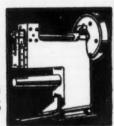
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Mr. Van Deventer, EDITOR OF THE IRON AGE,

addressed a group of executives in session recently, and afterward one of the executives sent in a personal subscription. Said he, "I ought to be reading regularly The Iron Age edited by an able man who can present his subject so clearly, logically and interestingly, and whose inspiration naturally directs the efforts of the editorial staff."

That same reaction is why subscribers throughout the metal-working industry read The Iron Age and pay \$6 for it. To advertisers the motto is unmistakable—buy space in the publication that attracts subscribers through editorial merit.